The New Zealand

Journal of Agriculture.

Published by direction of the Hon. W. Lee Martin, Minister of Agriculture.

Vol. 56. WELLINGTON, 21st MARCH, 1938. No. 3.

Management of Mastitis.

Programme for Dairy-farmers.

MASTITIS is a commonly recognized disease in dairy cows in all countries where dairying has assumed any importance. For many years past dairy-farmers in New Zealand have realized the seriousness of this complaint as a factor influencing the cost of production, in that it is one of the paramount reasons for the culling of cows at an early age.

The Department of Agriculture has from time to time performed extensive research work in connection with the disease and in devising methods of management aiming at its control. In recent months great interest has been created in the direction of attempts to reduce the incidence of mastitis, and, consequent upon the visit of Dr. G. J. Hucker, the Department of Agriculture is co-operating with the New Zealand Dairy Board and the Herd-testing Federation in an attempt to alleviate the position. Although it is recognized that no immediate cure is available, it is known that many management factors can be introduced to minimize the losses which now take place.

Before the dairy-farmer can institute any rational method of reducing losses from mastitis it is essential that he should know all the cows in his herd in any way affected with the complaint. In all herds there are cows affected which do not show any visible symptoms. The easiest method by which the farmer himself can determine all the cows affected is to test the herd with the mastitis indicator. These indicators consist of four test tubes and a bottle of brom thymol blue set in a small cardboard box, and complete instructions on their use will be supplied with each set. The Department of Agriculture has taken steps to procure mastitis-indicator sets, and these will be available at the cost price of 5s. per set, postage 1s. 6d., and will provide a method whereby the farmer can test his herd. Farmers desiring to obtain sets should apply to the district offices of the Department in Auckland, Wellington, Christchurch, or Dunedin.

The reasons for testing may be summarized as follows :—

(*a*) To enable the farmer to separate out and milk non-reacting cows first. If this is done the danger of reacting cows spreading the complaint to healthy cows is greatly reduced.

(*b*) To enable the farmer to breed from non-reacting cows of high production. There is evidence that calves from non-reacting cows are more likely to remain free from the complaint than calves from reacting cows.

(*c*) As an assistance in determining the animals that should be culled from the herd at the end of the milking-season.

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Prairie Grass	6d	5¼d	5d
BROWN TOP—	Per lb.	50 lb.	100 lb.
Govt. Certified	1/8	1/6½	1/6
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Alsyke	1/9½	1/8½	1/8
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Cowgrass, Colonial finest	1/2½	1/1½	1/1
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White Clover, ordinary	1/7½	1/6½	1/6¼
White Clover, N.Z. Govt. Certified	2/3	2/1	1/11
Subterranean, best M.D.	1/7½	1/6½	1/6
Trefoil	10½d	9½d	9d
Crimson	10d	9d	8d

	Per lb.	50 lb.	100 lb.
LUCERNE, Marlborough	1/6	1/5	1/4
LOTUS MAJOR, Pure Imported	3/3	3/1	3/–
LOTUS MAJOR, N.Z.	2/2	2/–	1/11
LOTUS ANGUSTISSIMUS	1/9	1/7	1/6
LOTUS CORNICULATUS	1/9	1/7	1/6
CRESTED DOGSTAIL	1/4½	1/3½	1/3
DANTHONIA	11½d	10½d	10d
FESCUE, Chewings	2/2	2/1	2/–
FESCUE, Meadow	1/–	11d	10d
LAWN GRASS, best	1/8	1/7	1/6
MUSTARD	11d	9½d	9d
MEADOW FOXTAIL	1/10	1/9½	1/9
PASPALUM, Australian, H.S.	1/4	1/3	1/2
PASPALUM, local	9d	8½d	8d
POA PRATENSIS	1/4	1/2½	1/2
TURNIPS	1/11	1/10	1/9
TIMOTHY	8½d	7½d	6½d
RAPE	9d	7½d	7d
RED TOP	1/3	1/2	1/1
WATTLE LOPHANTHA	9d	8d	7d

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	25 lb.	50 lb.	Sack Lots per 100 lb.	10-Sack per 100 lb.
BARLEY, ordinary	2/9	5/–	9/10	9/2
Clipped	2/10	5/6	10/8	10/–
MAIZE, whole	3/3	6/3	11/11	11/6
WHEAT, Australian	3/2	6/3	12/1	11/10
OATS, "B" Garton's	3/3	6/–	11/10	11/–
BRAN	2/–	3/8	7/–	6/9
POLLARD	2/3	4/3	8/3	8/–
Australian	2/9	5/3	10/3	9/9
BARLEYMEAL	3/–	5/9	11/–	10/9

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KALPHOS, ex ship	£5/17/6	SUPER LIME MIXTURE, ex Works	£3/7/6
SUPER, 44/46, ex Works	£3/16/–	POTASH MANURE, 30%, ex Store	£7/18/6

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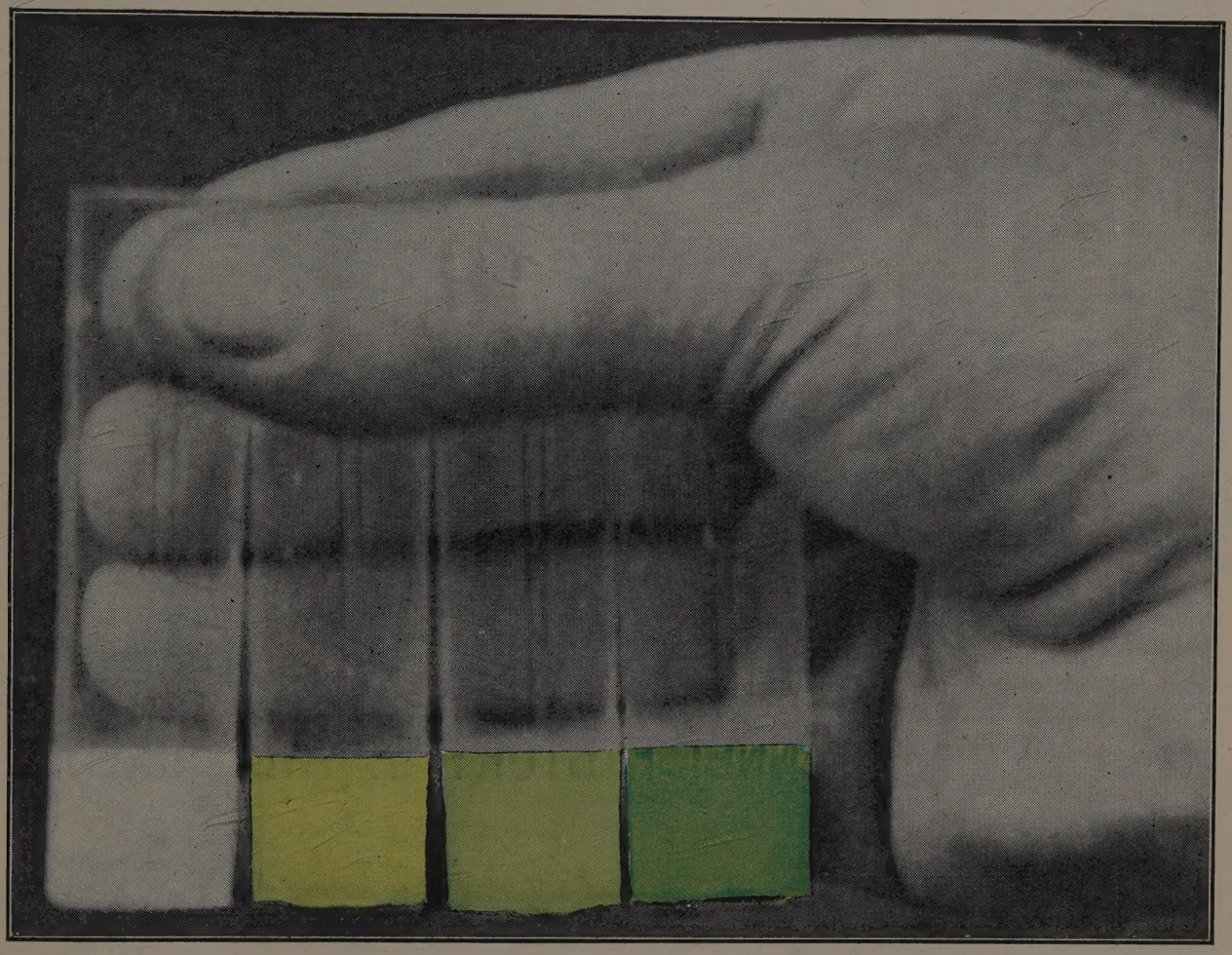
A. TESTING.

1. Test your cows by the indicator method.
2. Milk non-reacting cows first.
3. Retest from time to time the non-reacting group to make sure that some that were affected were not missed in the initial testing.



Close-up picture of tubes of indicator set in hand of dairyman. From left to right tubes show normal milk, normal milk containing drops of brom thymol blue, mild case of mastitis, severe case of mastitis. (Illustration of complete set over page.)

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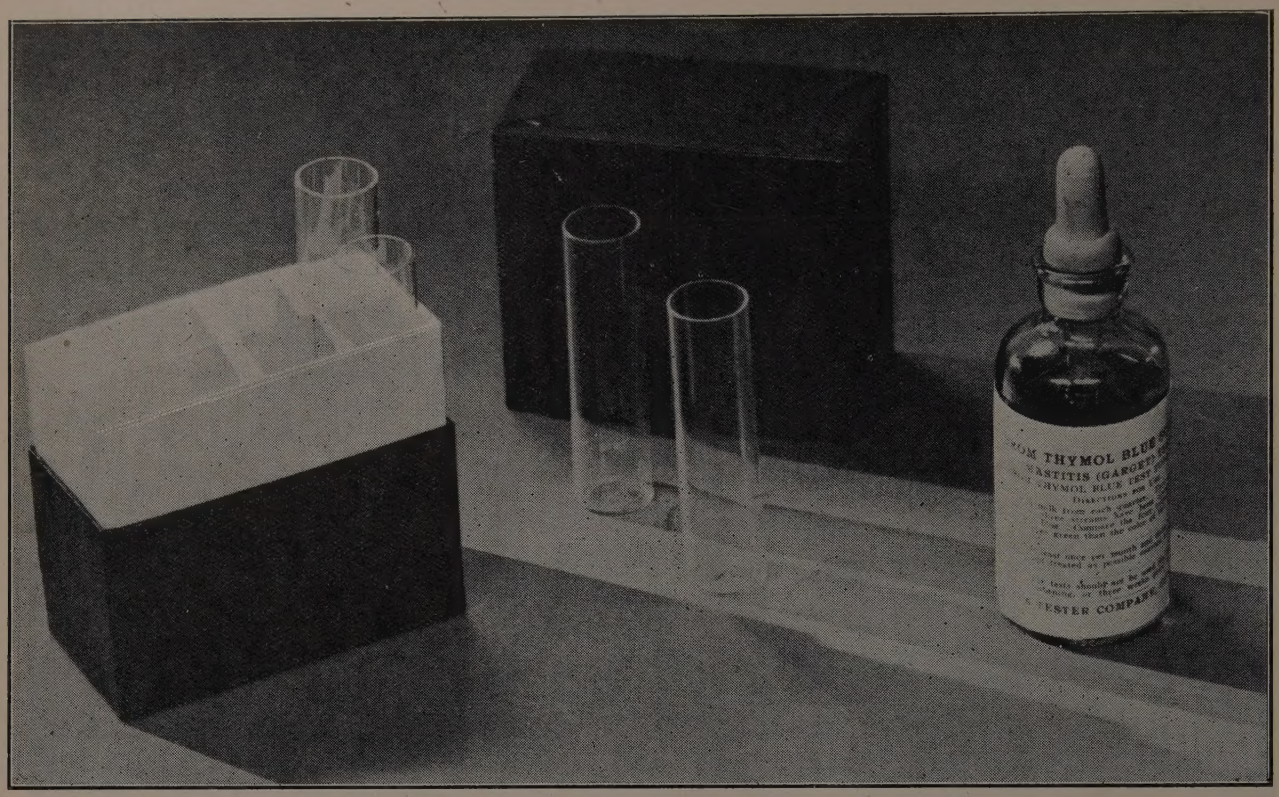
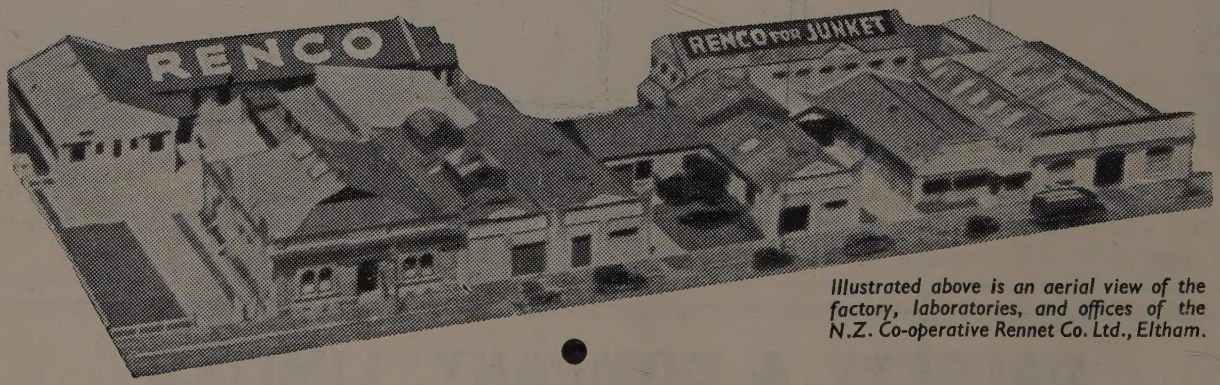


A mastitis-indicator set, which consists of four test tubes and a bottle of brom thymol blue enclosed in a case.

THE LARGEST RENNET FACTORY IN THE WORLD.



Illustrated above is an aerial view of the factory, laboratories, and offices of the N.Z. Co-operative Rennet Co. Ltd., Eltham.

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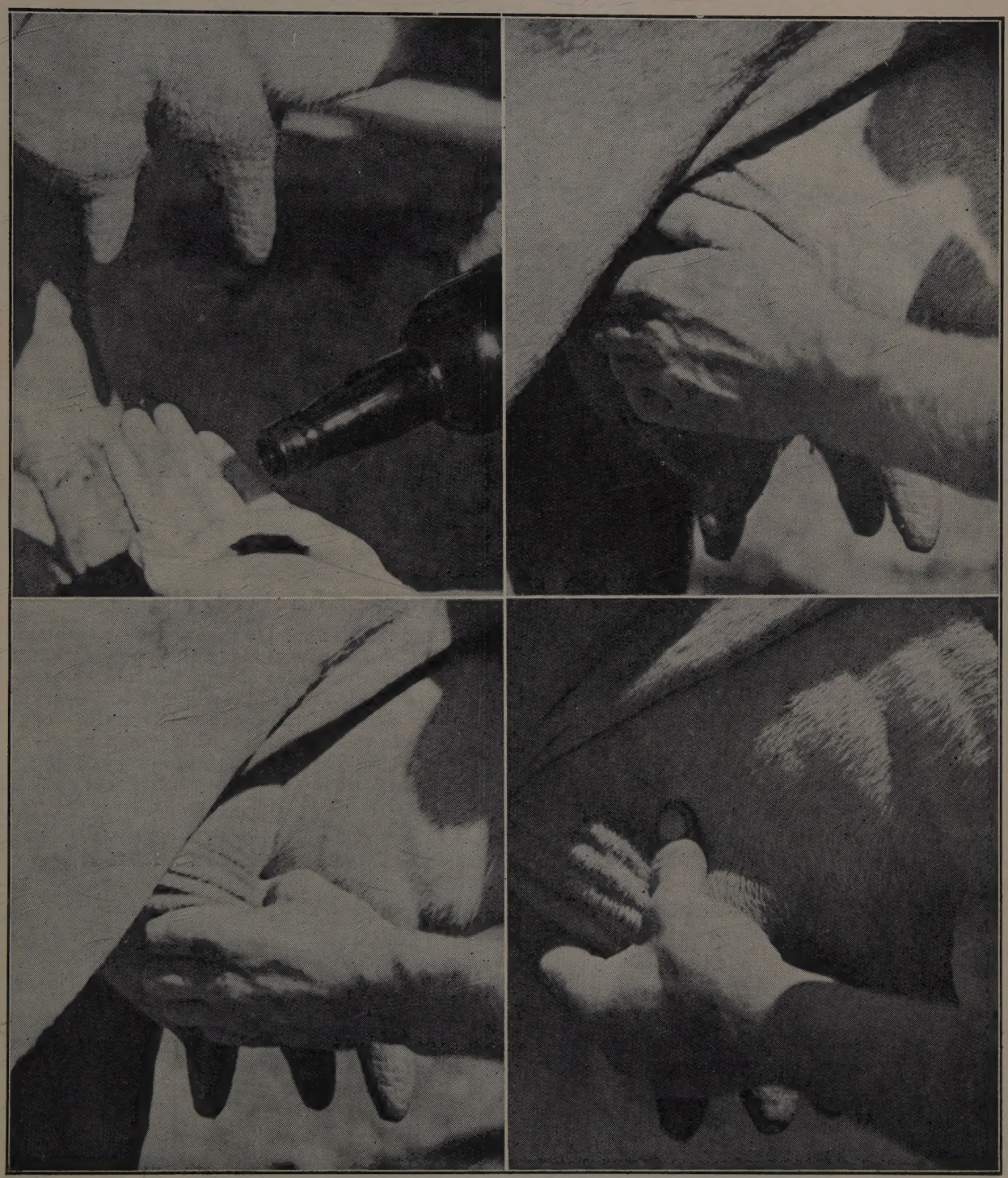
ELTHAM.

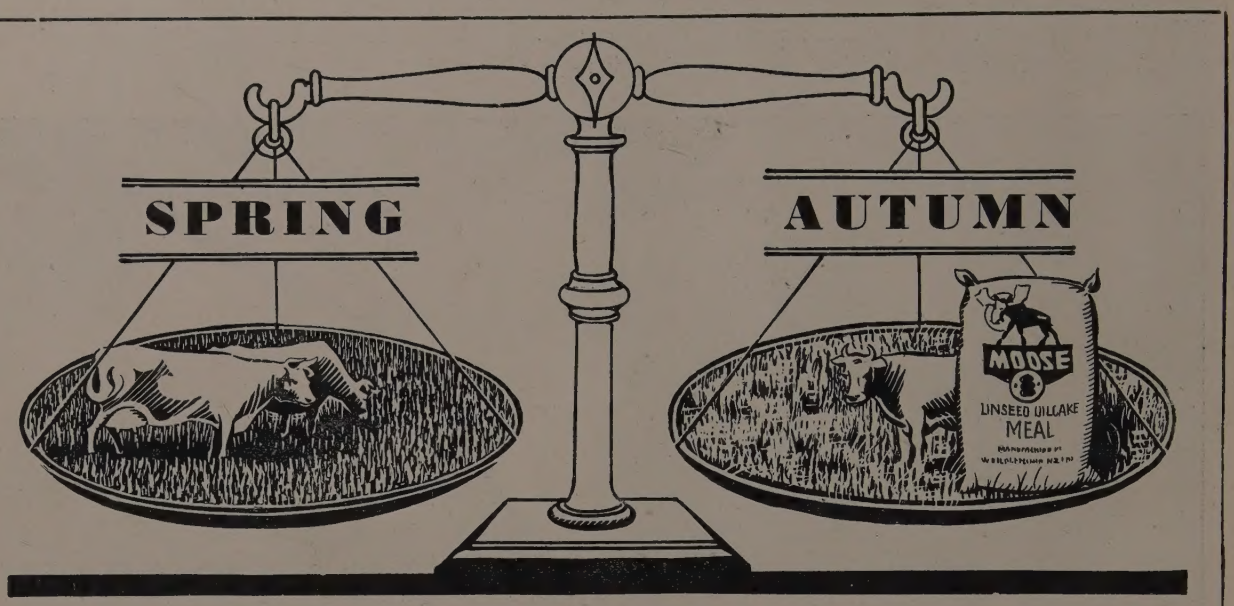
B. PROCEDURE TO BE ADOPTED WITH REACTING COWS.

1. If reacting quarter becomes swollen or acutely inflamed, adopt if possible any or all of the following methods to reduce inflammation as quickly as possible. Such methods *do not cure,* but may assist in preventing the condition becoming chronic :—



Massage of quarter: (*a*) Liniment for massage*; (*b*), (*c*), (*d*) applying liniment to reduce swollen areas. Frequent stripping is also necessary during massage.

* Liniment recommended : 2 oz. liquid extract belladonna to 2 pints of lin. saponis or camphorated oil.



Balance Your Autumn Pastures

Autumn pasture is about equal to spring pasture except in one thing — it is lower in protein.

Milkers during March - April - May get too much starch and not enough protein.

Their production drops much too fast.

This lower production resulting in a serious drop in the cream cheques can be checked by balancing the ratio.

HERE ARE THE FIGURES

With butterfat at 1/3 a handsome profit can be made by maintaining production with small quantities of high protein Moose Linseed Meal. A ration of 1lb. per cow every day for two months would cost only 8/- for the whole two months. This would nearly balance the ration and would check the downward movement of production, at very low cost.

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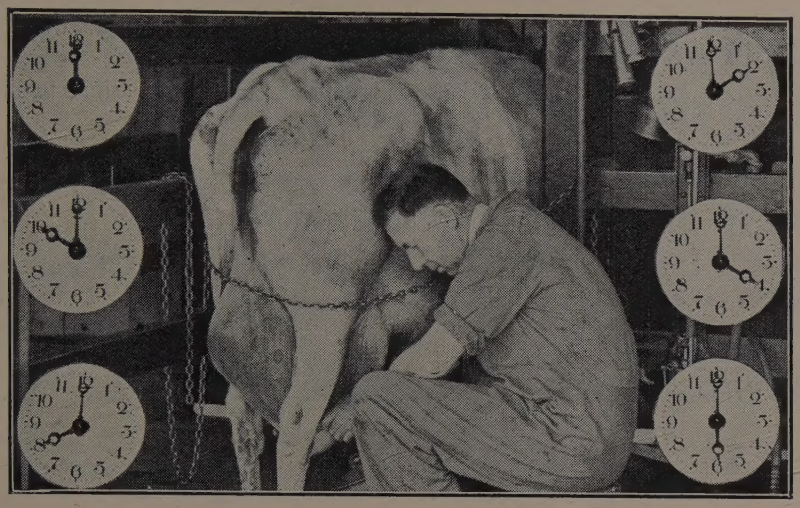
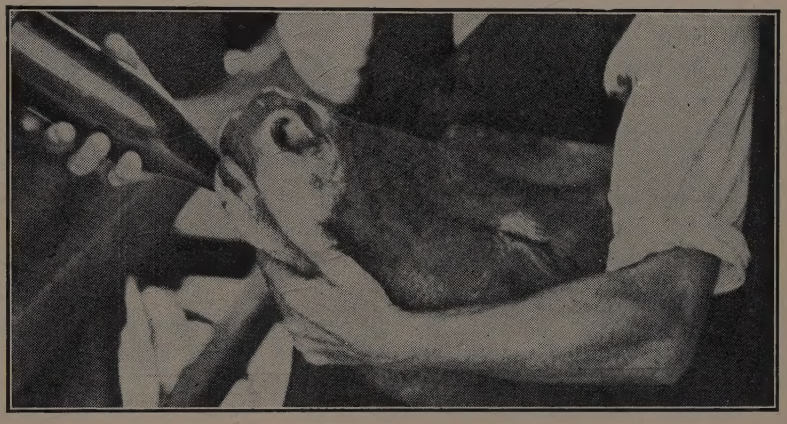


In acute cases frequent stripping of the affected quarter is essential.

Drench with purgative. The object of the purgative is to reduce milk production in the affected quarter. Do not elevate the head too high or the cow may choke.



Mastitis - affected cows should be withdrawn from herd on to paddock where feed is short.

2. If reacting quarter is regularly producing visibly abnormal milk such quarter should be dried off as quickly as possible. If this is done the milking-life of the cow is often greatly prolonged. There are several methods of rapidly drying off a quarter during the milking-season. Where farmers are adopting this method they should secure all information from the nearest Live-stock Division officer in their district.

3. Where reacting cows break down badly during the milking-season they must be culled out of the herd.

C. CULLING AT END OF SEASON.

At the end of the milking-season, if testing for mastitis has been regularly carried out, the farmer will recognize those animals that should be culled.

D. USE THE TEST TO DETERMINE REPLACEMENTS.

1. Never purchase any cows in milk unless they have been tested with the mastitis indicator.
2. Breed your own replacements from non-reacting cows of high production.

E. FURTHER PRECAUTIONARY MEASURES.

1. Always milk heifers first.
2. Test additions to the herd.
3. Strip well.
4. Avoid full feeding of cows for ten days before and ten days after calving.
5. Feed well during winter months.
6. Keep sheds and utensils clean.
7. Do not place machines on obviously affected quarters.
8. Keep careful watch on vacuum of machine-cups and have machine tested if there is a tendency to excessive number of swollen quarters in herd.
9. Teat-cups should fit well and be smooth.
10. Infected milk should not be stripped on to floor of milking-shed, but into bucket containing disinfectant.
11. Dip ends of teats in disinfectant solution after milking (some form of hypochlorite is best for this work).
12. Give serious consideration to cow-pox or other udder and teat sores. Attempt to segregate badly affected heifers to prevent spread.
13. Wash hands between milking of individual cows in disinfectant solution.

A check microscope test will be carried out at either of the Agricultural Department laboratories if the necessary samples are sent in for examination.

Address—Department of Agriculture, Hamilton; or Officer in Charge, Veterinary Laboratory, Wallaceville, per Private Bag, Wellington; or rail to Veterinary Laboratory, Wallaceville Station.

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FACTORIES THROUGHOUT NEW ZEALAND

Government Official Herd-testing of Purebred Dairy Cows.

Summary of the 1936-37 Season's Work.

Dairy Division.

THE season covered in this summary for the year ended 30th September, 1937, is the tenth in which Government official herd-testing has been carried out. Since the commencement of the system 18,794 statements of seasonal production have been issued, a yearly average of 1,879 cows. During the past season 2,102 cows were tested, an increase of 192 cows over the previous season's total of 1,910. This season 207 breeders tested cows, compared with 183 breeders in the previous season. The maximum number of certificate-of-record breeders testing cows during this period was 250, so that 83 per cent. took advantage of the Government official herd-test.

The 18,794 statements issued represent 12,953 different cows, 5,841 of which have been tested more than once. Several cows have been tested eight or more times, while three Friesians have been continuously tested for ten years. Many of the cows tested under this system have also been tested for certificate-of-record, so that the value of consistent and regular testing of purebred stock is becoming more evident to breeders.

Average butterfat production showed an increase of 6·44 lb. per cow, last season's average being 332·76 lb. fat, compared with 326·32 lb. fat for 1935–36.

The average period in milk was 282 days, a decrease of five days compared with the previous season.

The statistics appearing in this review are based on all cows on test for 180 days (six months) or more, the system being a 305-day (ten-months) test. Forty-seven grade cows were tested by special arrangement last season, compared with thirty-two during the previous season. These, and 151 registered purebred cows on test for less than 180 days, are not included in the tables.

The following figures show the average butterfat production for the various testing systems in the Dominion: the average of cows on group and Association herd-test for the 1936–37 season, based on all cows in milk 100 days or more, was 266·51 lb. fat in 254 days. *On the same basis*, the Government official herd-test average was 325·18 lb. fat in 276 days, the certificate-of-record 305-day test average was 437·94 lb. fat in 298 days, and the certificate-of-record 365-day test average 509 lb. fat in 354 days.

Table 1.—Official Herd-testing in Past Two Seasons on Basis of all Cows on Test for 180 Days or more.

Breed.	Number of Breeders.	Number of Cows.	Average Yield for Season.		
			Days.	Milk.	Butterfat.
				Lb.	Lb.
Jersey	156	1,259	286	6,062·1	332·56
Friesian	15	363	289	8,850·1	315·38
Milking Shorthorn	4	105	282	7,612·2	313·24
Ayrshire	1	6	305	5,455·0	241·91
Red Poll	1	17	274	5,589·3	227·15
Shorthorn	1	3	242	6,800·2	250·92
Totals and averages	*175	1,753	287	6,726·9	326·32
Season 1936–37.					
Jersey	173	1,339	282	6,154·8	335·61
Friesian	24	425	286	9,611·1	342·48
Milking Shorthorn	6	98	266	7,085·7	285·39
Ayrshire	2	25	286	7,097·1	304·11
Red Poll	1	17	240	4,490·0	181·02
Shorthorn	†	†	†	†	†
Totals and averages	*203	1,904	282	6,971·7	332·76

* Totals do not agree, since some breeders tested more than one breed. † Not represented.

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MILKING TIME.

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MILKEEZE

Shorten the hours in the bail—increase the milk yield—
Use
Patten's MILKEEZE
For quicker, easier milking.
Thousands of Dairyfarmers throughout the Dominion are praising MILKEEZE—the ideal preparation for sore, wounded teats, and cracked, swollen udders.
MILKEEZE keeps teats soft and supple. Positively does not taint the milk. *From all Chemists and Stores in*
1-lb. tins, 2/3; 4-lb. billies, 6/6; 36-lb. tins, 1/4 per lb.

Table 2.—Average Production in Classes and Breeds for all Official Herd-test Cows.

Class.	Season 1935–36.				Season 1936–37.			
	Number of Cows.	Average Days.	Average Milk.	Average Butterfat.	Number of Cows.	Average Days.	Average Milk.	Average Butterfat.
			Lb.	Lb.			Lb.	Lb.
Jersey.								
Two-year-old and under	503	288	5,460·7	300·10	574	283	5,500·5	300·36
Three-year-old	265	290	6,166·1	339·36	266	280	6,198·9	342·10
Four-year-old	173	287	6,474·5	360·53	179	285	6,855·2	371·24
Mature	318	282	6,702·5	363·01	320	280	6,899·9	373·49
Friesian.								
Two-year-old and under	70	290	7,369·1	266·03	99	290	8,239·8	297·84
Three-year-old	72	288	8,258·7	295·10	69	282	8,904·3	322·46
Four-year-old	59	282	9,031·8	322·05	79	285	9,875·2	351·12
Mature	162	292	9,686·7	343·22	178	286	10,530·4	371·22
Milking Shorthorn.								
Two-year-old and under	14	286	5,906·3	246·77	32	272	5,887·4	240·08
Three-year-old	26	282	6,593·2	273·19	14	247	6,044·2	242·96
Four-year-old	22	283	7,341·2	307·10	20	265	7,376·4	293·49
Mature	43	282	8,922·2	360·02	32	270	8,558·1	344·20
Ayrshire.								
Two-year-old and under	5	305	5,442·3	241·03	10	296	5,891·0	244·89
Three-year-old	1	305	5,518·1	246·31	1	268	6,314·1	255·02
Four-year-old	..	..	..	..	2	235	5,582·2	246·06
Mature	..	..	..	..	12	287	8,420·0	367·23
Red Poll.								
Two-year-old and under	3	251	4,883·6	215·17	6	208	3,240·9	132·43
Three-year-old	4	287	4,529·9	179·88	..	..	..	..
Four-year-old	4	274	6,285·2	238·72	6	242	4,226·1	158·87
Mature	6	277	6,184·4	256·95	5	277	6,305·7	265·89
Shorthorn.								
Two-year-old	..	..	..	..	Not represented.			
Three-year-old	..	..	..	..				
Four-year-old	1	219	7,509·4	273·25				
Mature	2	253	6,445·6	239·75				

The White Butterfly.

FROM Wellington to Taranaki along the west coast the hot, dry weather of January and early February has seen a remarkable increase in the numbers of white butterfly. Crops of swedes, rape, and chou-moellier are easily recognized by the concentration of white butterfly over them.

A close examination of many crops, however, has shown that the actual damage done by the caterpillars is not nearly so much as that being done by the much less conspicuous diamond-backed moth and the still smaller cabbage aphis. Where crops are healthy and growing well even these pests have made little headway, but it is on the crops that are suffering through lack of moisture that most damage by insect pests is done.

Throughout the area referred to the white-butterfly parasite, which attacks the chrysalids, has been liberated during the past few years. It is probable that owing to the unfavourable conditions for the butterfly last year the parasite also was greatly reduced in numbers. The Entomologist at Cawthron Institute is confident that the rapid increase of the butterfly will be followed closely by a rapid increase in the numbers of the parasite, and that few of the present generation of caterpillars will survive to develop into butterflies again.

During the next few weeks large numbers of the pupæ in their little cases should be found on the posts of fences around swede and rape crops, and a close examination of these should show whether the parasite is at work or not. Parasitized chrysalides are more dry and brittle than are those not attacked by the parasite. The necessity for the liberation in any particular locality of fresh supplies of the parasite can thus be ascertained by interested farmers. Where fair numbers of the chrysalides are dry and brittle, the parasite is at work, and fresh liberations are not likely to improve the position.

It is, of course, possible that the rapid increase of the parasite necessary to control the present rather alarming spread of the white butterfly is prevented by the development of a hyperparasite—that is, one that attacks the butterfly parasite itself. An investigation of the position is being made.

What is Cobalt?

K. J. McNaught, Chemistry Section, Department of Agriculture.

SINCE the discovery that cobalt is curative of bush sickness much attention has been focussed upon this highly potent substance.

The name "cobalt" appears to have been derived from an old German word "kobald," meaning an evil spirit or goblin supposed by the old Teutons and Scandinavians to haunt the mines. The term came to be applied to "false ores"—that is, ores which did not give metals by processes then in use for the preparation of metals. Some such ores were found useful for colouring glass blue, and the term was gradually confined to those minerals which were used to impart a blue colour to glass and glazes. In 1735 Brandt stated that the blue-colouring principle was due to the presence of a new metal, which he called "cobalt rex," whence the name "cobalt."

Cobalt, an element closely related to iron and nickel, with which it is generally associated in nature, is a steel-grey metal with a tinge of red, but when polished is silvery-white in colour. Like nickel and iron, it is capable of being magnetized, though only to a slight extent. Cobalt is not a common element in nature. The metal is occasionally found in meteorites along with iron and nickel, but its principal naturally-occurring compounds are "smaltite" or "tin-white cobalt" in combination with arsenic, "cobaltite" or "cobalt glance" in combination with arsenic and sulphur, and "erythrite" or "cobalt bloom" in combination with arsenic and oxygen. A manganese ore containing cobalt and nickel is found in extensive deposits in New Caledonia and is an important source of cobalt compounds, though most of the world's commercial supply now comes from Sudbury, Ontario, in Canada, where the arsenides of cobalt and nickel are associated with silver, and constitute a valuable by-product of the silver-mining of that district.

Uses of Cobalt.

The use of cobalt for imparting a blue colour to glass appears to have been known to the ancient Greeks and Romans, and even to this day cobalt still finds its main commercial use in the pottery and enamelling industries to give a blue colour to glass, enamels, stoneware, and pottery glazes. It is also used as a drier in the manufacture of some paints, while some water colours and oil colours contain cobalt compounds. The beautiful "cobalt-blue" pigment is a compound of cobalt oxide and aluminium oxide. Cobalt is occasionally used in non-corrosive alloys and for the preparation of hard steels.

When dissolved in hydrochloric acid, sulphuric acid, or nitric acid, cobalt metal forms the chloride, sulphate, or nitrate of cobalt respectively, all three salts giving fine, red-coloured solutions. If the pink solution of cobalt chloride be mixed with hydrochloric acid it turns blue, especially if heated, but the red colour is restored by dilution. This property of cobalt salts has been used in preparing "invisible" inks. Characters written with the pink solution on paper are colourless and invisible, or nearly so, but when the paper is warmed by holding it near a fire the writing becomes visible and appears of a distinct blue. Provided the paper has not been overheated, the colour will disappear again on cooling. The chloride and thiocyanate of cobalt have been used to impregnate paper, giving it ordinarily a pink tint indicating the presence of moisture, while on drying the colour changes to blue. In the past, before the use of the modern barometer, advantage was taken of this fact to produce the so-called barometer paper.

Local Sources.

The demand for cobalt has drawn attention to the possibility of local sources of cobalt. New Zealand has no extensive mineral deposits of cobalt ore, but some soils, especially in parts of the South Island, are relatively rich in cobalt, though it must be noted that the actual amounts present are really very small. Some limonites, a type of iron ore, especially from North Auckland, contain appreciable amounts of cobalt, and since 1931 have been used extensively and very successfully in the treatment of bush sickness. A deposit of manganese ore in the North Island is fairly rich in cobalt, and it is quite probable that the minute amount of cobalt present in normal soils is in the form of a combination of cobalt oxide with manganese oxide. On a very conservative estimate, however, more than a million acres of land in the North Island are markedly deficient in cobalt. In such localities the deficiency must be remedied by specially top-dressing the pastures or by administering cobalt salts to stock by dosing or by the use of limonite-salt or cobaltized-salt licks. It must be emphasized, however, that stock require only extremely minute amounts of cobalt, and, indeed, in larger amounts cobalt is poisonous to animals. The potency of such minute traces of cobalt is difficult to understand, but evidently cobalt provides a necessary link in some vital process in the animal body.

The "cobalt" used in practice for lick and drench purposes is one of the salts cobalt chloride, cobalt sulphate, or cobalt nitrate, which are very soluble in water, and in a form therefore which can be readily utilized by stock.

False Impression.

The fact that many of the important ores of cobalt contain arsenic may have led to the false impression apparently prevalent in some quarters that cobalt as used in farming practice at the present day contains arsenic. The process of concentration and purification of cobalt salts before marketing should by its very nature result in a complete separation of arsenic. Consequently, if arsenic is present in any sample of cobalt salt it is there only as an impurity. Even if detectable amounts of arsenic should be present as an impurity in the cobalt salts used for the treatment of bush sickness, the amount present in the very small doses used in practice would be so infinitely minute that it could not exert any effect at all. A warning against the attempted use of arsenic in the treatment of bush sickness should, however, scarcely be necessary. It is not claimed that a deficiency of cobalt provides a complete explanation of the problems associated with bush sickness, but it can be stated with certainty that cobalt, either as the pure salt or as impurity in such substances as ferric ammonium citrate and limonites, is the only substance which has been definitely proved to cure bush sickness.

Correction.

In the article "Importance of Cobalt" in the January issue of the *Journal* the statement concerning the incidence of bush sickness in the second column on page 24 should read: "Where *cattle* are affected the cobalt content appears to vary from 0·01 to 0·04; where *sheep* but not *cattle* are affected the cobalt content appears to lie between 0·04 and 0·07."

AUCKLAND

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WANGANUI

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Agricultural Regulations.

The Sale of Superphosphate.

A. E. Morrison, Solicitor, Department of Agriculture.

THE Board of Trade (Fertilizer Price) Regulations 1938, which came into force on 26th February, revoke the 1936 regulations fixing the prices for superphosphate and any imported phosphatic fertilizer, and re-enact the provisions of the revoked regulations modified as follows:—

The price at which superphosphate may be sold ex-works or f.o.r., specified rail points, to consumers, storekeepers, and merchants is the same as that fixed under the revoked regulations, but dairy companies and farmers' organizations having a trading department conducted on a co-operative basis may purchase superphosphate for resale to suppliers or members at the same price as that chargeable to merchants — viz., £3 11s. 6d. per ton in the North Island and £3 15s. 6d. per ton in the South Island.

The price to be charged to consumers —*i.e.*, persons purchasing superphosphate for their own use and not for resale— has not been altered—viz., £3 16s. per ton in the North Island and £4 2s. per ton in the South Island.

The prices at which superphosphate may be sold for delivery ex store or delivery at other than the fixed rail points shall be the respective prices prescribed plus freight to the place from which the fertilizer is delivered.

The prices fixed are for a sale for cash or monthly credit, but no sale of superphosphate shall be made where more than one month's credit is given at a price lower than the appropriate price prescribed. Nevertheless, superphosphate may be sold at a price exceeding the appropriate price prescribed if the sale is made subject to the condition that if payment is made before the twentieth day of the month following the day of delivery the price of the superphosphate shall be reduced to the appropriate price prescribed.

In respect of sales to a consumer, the vendor is required to set out in the invoice or debit note issued to the consumer, (*a*) the price of the goods, and (*b*) the freight (if any) payable by the purchaser.

The giving or receiving in connection with any sale of superphosphate or phosphatic fertilizer of any discount, rebate, dividend, bonus, or other payment or allowance, whether in money or moneys worth, is prohibited. Dairy companies and farmers' co-operative organizations may, however, make a distribution of profits arising from sales of superphosphate or phosphatic fertilizers to their shareholders or members by way of bonus or dividend computed by reference to general trading profits not arising exclusively from sales of superphosphate.

The regulations do not apply to any sale or purchase of superphosphate or phosphatic fertilizer in a quantity of less than 10 cwt., so long as such sales or purchases are not made at prices or on terms more advantageous to the purchaser than the prices and terms prescribed by the regulations.

The penalty for a breach of the regulations is a fine of £200 or three months' imprisonment.

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Agricultural Workers Extension Order, 1938.

By the terms of the Agricultural Workers Extension Order, 1938, which came into force on 14th February, the provisions of Part III of the Agricultural Workers Act, 1936, relating to conditions of employment on dairy-farms, are, with necessary modifications, extended to include agricultural workers employed in commercial orchards in a permanent or temporary capacity.

The maximum number of hours which may be worked without payment of overtime rates, including Sunday work, are computed on the basis of a fortnight, and vary according to the particular season of the year. From the commencement of the third week in May until the 31st August the fortnightly hours must not exceed eighty; from the 1st September to the 30th November, eighty-eight hours; from the 1st December until the end of the second week in May, ninety-six hours. If, during any prescribed period, the fortnightly quota of hours is exceeded, workers must be paid at overtime rates of time and a half for the additional hours worked, except in cases of frost-fighting. Nevertheless, the prescribed periods may be varied to suit any particular district by arrangement with the respective unions of the workers and the employers.

No worker shall be employed for more than five hours without an interval of three-quarters of an hour for a meal. Workers are entitled to the usual statutory holidays and a picnic-day, and if any worker is employed on any such day he shall be paid at double-time rates of pay. After twelve months' continuous employment with the same employer a worker shall be entitled to one week's holiday on full pay. Any permanent employee whose employment is terminated after three months' continuous employment for any reason other than misconduct shall be paid a proportionate sum in lieu of the holidays prescribed.

If a permanent worker is required to work on any Sunday, an extra half day or a day and a half must be added to his annual holiday, according to whether the worker did not work or worked on the preceding Saturday. Special provision is made for Sunday work in connection with the harvesting of stone-fruits.

Wages, which must be paid in cash unless otherwise agreed, are calculated on a weekly basis in the case of permanent workers, and on an hourly basis in the case of casual workers. The minimum rates of wages for male workers shall be £4 2s. per week in the case of adult managers and £3 18s. per week in the case of other adult workers, subject to a deduction of 17s. 6d. per week in both cases if board and lodging is provided.

Youths permanently employed shall receive wages increasing by annual increments from £1 at the age of fifteen to £2 12s. 6d. at the age of twenty-one. A proportionate deduction from wages ranging from 7s. 6d. in the case of a fifteen-year-old youth to 10s. in the case of a youth aged twenty to twenty-one years is made if board and lodging is provided. The proportion of youths employed must not exceed two for every adult worker, unless there is a scarcity of adult labour.

The rates of wages for casual workers—*i.e.*, those workers employed on an hourly or daily basis—shall be 1s. 9d. per hour in the case of adult male workers, 1s. 5d. per

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hour in the case of adult female workers, 1s. 3d. per hour in the case of youths and girls over eighteen years of age, and 1s. per hour in the case of youths and girls less than eighteen years of age. The same provisions regarding Sunday work by permanent workers and payment of overtime rates of wages apply with slight modifications to persons employed as casual workers.

Casual workers are entitled to one day's holiday on full pay for each six weeks of continuous service with the same employer.

Every worker employed in an orchard for more than four weeks must join the New Zealand Workers Industrial Union of Workers, and the onus is on the worker's employer or his agent to see that union dues are paid.

The foregoing summary of the Order is not intended to be exhaustive. Persons interested, however, may obtain a copy of the Order on application to the Government Printer, Wellington—price 3d., plus postage 1d.

Sausage-casing Importations.

BY the Sausage-casing Importation Regulations 1938, made under the Stock Act, 1908, the regulations made in 1932 on the same subject are revoked and new regulations substituted.

The previous regulations prohibited the importation of sausage-casings of animal origin from all countries except the Commonwealth of Australia, the Dominion of Canada, and all States in the United States of America exclusive of the States of California, Oregon, Nevada, Arizona, and New Mexico. Consignments of sausage-casings from the countries or States from which their importation was permitted required to be accompanied by a declaration of health verified by a certificate signed by a Government Veterinarian in the country or State of export.

The new regulations re-enact the provisions of the revoked regulations, and at the same time remove the embargo on the importation of sausage-casings from those States in the United States of America mentioned above.

Many areas found on farms are untillable by reason of the presence of rocks, deep gullies, swamps, &c. Some of these areas can be made productive by pasturage, but the rough areas can generally be made productive by being given over to the growing of forest-trees for timber-production.

Fertilizer Table.

INQUIRIES are continually being received from home gardeners and other users of small quantities of fertilizer as to how much manure should be applied per square yard. The following table is submitted :—

1 cwt.	fertilizer per acre equals	0·37 oz. per square yard.
2 cwt.	,,	0·74 oz. ,,
3 cwt.	,,	1·11 oz. ,,
4 cwt.	,,	1·48 oz. ,,
5 cwt.	,,	1·85 oz. ,,
6 cwt.	,,	2·22 oz. ,,
7 cwt.	,,	2·59 oz. ,,
8 cwt.	,,	2·96 oz. ,,
9 cwt.	,,	3·33 oz. ,,
10 cwt.	,,	3·70 oz. ,,

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Onion Regulations.

BY the Board of Trade (Onion) Regulations, 1938, which came into force on 26th February, all previous regulations made under the Board of Trade Act, 1919, relating to the production and marketing of onions in New Zealand are revoked and new regulations substituted.

For the purpose of the regulations New Zealand is divided into the following three onion districts—*i.e.*, No. 1 district (roughly the northern half of the North Island); No. 2 district (roughly the southern half of the North Island); and No. 3 district (which embraces the whole of the South Island).

All onions which are offered for sale in New Zealand fall into two main groups—namely, graded or ungraded onions. All graded onions must be classified either as f.a.q. grade or pickler-grade onions, and the standards necessary for determining either grade are set out in the regulations. Sacks containing graded onions need not bear any distinguishing mark, but sacks containing ungraded onions must be marked with the letter "X."

Complaints regarding graded onions sold for delivery in the district in which they were grown are dealt with by a Complaints Committee, which is set up by the New Zealand Grain, Seeds, and Produce-merchants' Federation. The decision of the Committee in respect of the grade of any onions is final and binding on all parties. If the Committee decides that any line of onions fails to comply with the standards prescribed for f.a.q. grade the onions may, at the option of the owner, either be re-sorted so as to comply with the f.a.q. grade standard or sold only in the district in which they were grown, according to their then quality and condition, as if they were ungraded onions.

All sales and purchases, by wholesale, of New-Zealand-grown onions must be made according to the provisions of the regulations, but the regulations do not apply to sales and purchases of onions made during the months of January and December in any year. In those months the trade in onions is absolutely free from all restrictions imposed by the regulations.

Ungraded onions may be sold by public auction in the district in which they were grown, but cannot be sold by public auction outside that district unless a permit to do so is obtained from the Director-General of Agriculture.

Graded onions grown in the South Island may not be shipped for sale to the North Island unless they are accompanied by a certificate of confirmation of grade. Prior to shipment all such onions must be re-examined by a grader appointed by the New Zealand Grain, Seeds, and Produce-merchants' Federation, or by the Minister of Agriculture, for the purpose of seeing that the line is of f.a.q. grade quality. If the grader is of the opinion that the particular line of onions is not of f.a.q. grade quality, their owner may be permitted to sell such onions according to their quality and condition in the South Island; or he may have the line re-sorted to conform with f.a.q. grade standard and resubmitted to a grader for examination for a certificate of confirmation of grade. Where onions are shipped from the South Island for sale in the North Island, and by reason of subsequent storage or other causes have deteriorated to such an extent that it would be impossible to sell them at the minimum price prescribed by the regulations, the Director-General, on application made by the buyer or consignee, may authorize the sale of such onions according to their quality and condition and free from all restrictions as to the minimum price prescribed by the regulations.

The minimum price for f.a.q. grade onions is £4 per ton ex the port or railway-station, whichever is nearest the place at which the onions were grown.

No minimum price is fixed in respect of the sale of pickler-grade onions.

When f.a.q. grade onions are sold by public auction the upset price must be such as to return to the grower £4 per ton, less the auctioneer's charges for conducting the sale. Graded onions can only be sold for delivery outside the district in which they were grown by the onion-grower personally, or by a member of the New Zealand Grain, Seeds, and Produce-merchants' Federation, or by a member of some other body approved by the Minister of Agriculture for that purpose. Persons acting on behalf of an onion-grower in effecting a sale of onions cannot make greater charges for their services than those prescribed by the regulations.

One committee, called the New Zealand Onion Marketing Advisory Committee, and composed of Government representatives and representatives of the onion-growers and wholesale onion-merchants of New Zealand, is to be established. The function of this Committee is to advise the Minister to what extent (if any) the minimum prices at which graded onions shall be sold should be varied from time to time, and generally to advise on matters referred to it relating to the production and marketing of onions.

Onion-growers and wholesale onion-merchants are required to register annually with the Director-General of Agriculture, by whom a certificate of registration will be issued for the registration period ending on 30th November in each year. Application for registration should be made forthwith.

Onion-growers and wholesale onion-merchants must, within seven days of the close of each month, furnish the Director-General of Agriculture with monthly returns showing the stocks of onions sold, delivered, or held during the preceding month, similar to the returns furnished last year. No return, however, is required to be furnished in the months of January and December in any year.

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Trials of Agrosan and Ceresan.

J. C. NEILL, Plant Diseases Division, Plant Research Bureau, Palmerston North.

Fig. 1.—Seed of sheaf on right was treated with mercury seed-dust, 2 oz. to bushel. Sheaf on left from untreated seed. The increase from treatment was estimated at 15 bushels to the acre.

THE treatment of cereal seeds with organic mercury dusts has largely replaced the old "pickling" methods in New Zealand. This has been due to their reliability as controllants of smut diseases and to their favourable effect on germination.

The two principal dusts on the New Zealand market are "Agrosan G" and "Ceresan." Since both are proprietary materials, marketed under trade-names, it is necessary that efficiency tests should be made whenever their composition is changed. Such changes have been made recently with both dusts, accompanied by slight alterations in their trade names —"Agrosan G" becoming "Agrosan G Improved" and "Ceresan" becoming "Ceresan (1875A)."

The present article reports the results of trials with these new materials as to their effects on disease-control and seed-germination with wheat, barley, oats, and peas when sown immediately following dusting and after periods of storage of the dusted seed up to five months. Both dusts were used at the uniform rate of 2 oz. per bushel of seed.

Effect on Disease-control.

No stinking smut developed in any of the plants from seed dusted with Agrosan G Improved or Ceresan (1875A) using three varieties of wheat—Jumbuck, Major, and Solid Straw Tuscan—the untreated seed of which developed 8·4 per cent., 1·3 per cent., and 3·9 per cent. of smutted plants respectively.

Covered smut and stripe of barley were eliminated by both dusts from three naturally infected varieties, two being two-rowed malting barleys and one a six-rowed "Cape" barley, the untreated seed of which developed 6·2 per cent., 3·8 per cent., and 0·9 per cent. of smut, and 0·6 per cent., 0 per cent., and 7·1 per cent. of stripe respectively.

Both loose and covered smuts of oats were eliminated by both dusts from lines of Garton's Abundance, Dun, and Algerians, which developed 6·8 per cent., 11·2 per cent., and 3·7 per cent. of smutted plants from the untreated seed. An additional trial with a heavily smutted line of Garton's Abundance, which showed 18·3 per cent. of smutted plants from untreated seed, showed 0·8 per cent. and 0·5 per cent. of smutted plants from the dusted seed.

No oat stripe appeared in the trials.

Effect on Germination.

All seed dusted with both materials showed a higher germination in the field than the same seed not dusted, with the exception of one line of wheat. In this latter trial the differences were within the margin of experimental error, and therefore cannot be considered as real. No difference was shown in laboratory tests between the dusted and undusted seeds.

Storage of dusted seed up to five months did not affect the germination in laboratory or field.

No visual differences were apparent between any of the trial plots at any stage of growth.

With Marrowfat peas germination was improved from 12 per cent. to 14 per cent. by both dusts, whether stored up to five months or sown immediately following dusting.

Experimental Method.

Samples of bulk lines of seed were treated uniformly on dates as shown in table, stored in paper bags in the laboratory, and all sown and tested within four days of the final treatment on 19th July. Seed from each treatment was sown by hand in 4-rod rows, one hundred seeds per row, the corresponding untreated

Fig. 2.—A simple hand-operated dusting churn made from an oil-drum.

seed being sown in twelve similar rows, scattered through the plot. Germination counts were taken at two weeks after first emergence, and disease counts at maturity. The line of oats shown in the table as treated on 8th October was sown on the following day in five replications of four hundred seeds for each treatment and for the untreated seed.

All figures represent mean percentages. The laboratory tests were made by Mr. N. R. Foy, Government Seed Analyst, to whom my thanks are due.

Summary of Results.

Agrosan G Improved and Ceresan (1875A), when dusted on to moderately infected seed at 2 oz. per bushel, effectively controlled stinking smut of wheat, covered smut and stripe of barley, and both covered and loose smuts of oats. With heavily smutted oats control was nearly, but not quite, complete. Both dusts improved field germination of wheat, barley, oats, and peas. Storage of dusted seed up to five months did not affect germination.

Table of Results.

Date dusted	15th March.			15th April.			17th May.			15th June.			19th July.										8th October	
Treatment.	Germination.		Disease.	Germination.		Disease.	Germination.		Disease.	Germination.		Disease.	Germination.		Smut.	Stripe.	Field Germination.	Smut.	Stripe.	Field Germination.	Smut.	Stripe.	Field Germination.	Smut.
	Laboratory.	Field.		Laboratory.	Field.		Laboratory.	Field.		Laboratory.	Field.		Laboratory.	Field.										
Wheat.																	**Jumbuck.**			**Major.**			**S.S. Tuscan.**	
Untreated	..	..	..	..	..	..	..	..	..	..	..	..	97	71	8·4	..	58	1·3	..	81	3·9	..	..	..
Ceresan (1875A)	97	68	0	99	75	0	96	75	0	94	69	0	93	75	0	..	68	0	..	77	0	..	..	..
Agrosan G. Imp.	..	68	0	96	73	0	96	76	0	97	77	0	93	77	0	..	68	0	..	78	0	..	..	..
Barley.																	**Cape.**			**S.A. Chevalier.**			**N.Z.Chevalier**	
Untreated	..	..	..	..	..	..	..	..	..	..	..	..	98	79	0·9	7·1	64	6·2	0·6	52	3·8	0	..	..
Ceresan (1875A)	98	91	0	97	89	0	98	87	0	99	89	0	99	87	0	0	70	0	0	60	0	0	..	..
Agrosan G. Imp.	99	87	0	99	90	0	99	88	0	99	88	0	99	88	0	0	71	0	0	60	0	0	..	..
Oats.																	**Garton's Abundance.**			**Dun.**			**Algerian.**	**Garton's.**
Untreated	..	..	..	..	..	..	..	..	..	..	..	..	99	74	6·8	..	85	11·2	..	86	3·7	..	81	18·3
Ceresan (1875A)	97	86	0	98	85	0	99	87	0	98	81	0	97	86	0	..	89	0	..	91	0	..	84	0·8
Agrosan G. Imp.	99	83	0	98	75	0	97	89	0	97	90	0	97	89	0	..	90	0	..	98	0	..	86	0·5
Peas.																	**Marrowfat.**							
Untreated	..	..	..	..	..	..	..	..	..	..	..	..	95	49	..	..	..	..	..	..	..	..	..	..
Ceresan (1875A)	87	50	..	97	51	..	95	53	..	80	53	..	95	56	..	..	..	..	..	..	..	..	..	..
Agrosan G. Imp.	89	51	..	86	49	..	95	52	..	88	55	..	93	54	..	..	..	..	..	..	..	..	..	..

Eradication of Hard Fern

THE eradication of hard fern (*Paesia scaberula*), also called ring fern, creeping fern, or carpet fern, is one of the major problems confronting the hill-country grazier of the high-rainfall belt of the North Island of New Zealand.

The grazier effects a partial control by the periodical burning of clumps and reseeding the area. The effectiveness of the method depends mainly on whether or not a really hot fire is obtained, thereby destroying the rhizomes by which the plant spreads. Unfortunately, it is only in hot, dry seasons that a sufficiently roasting fire can be secured to kill the rhizomes. In most cases, after an apparently good fire, the fern again makes its appearance in the form of a ring around the area previously burnt out. To ensure the complete destruction of the rhizomes, spraying with arsenic pentoxide has been found to be very effective.

Experiments conducted by Levy and Madden* show that a 1–320 solution is the most reliable to use. In preparing the solution, care should be taken not to immerse the hands therein. Spraying is best done with a knapsack spray-pump fitted with fine double nozzles. The fern should be well wetted all over, care being taken to spray the edges of each patch well. As arsenic pentoxide is poisonous, all stock should be kept off the area for at least a week or until rain falls. Where burning and autumn seeding is to be done following the spray, some three or four weeks should be allowed for the chemical to kill the plants before the area is burnt. After burning, the patches should be seeded with a secondary burn mixture as outlined in the *Journal* for January, 1938. The application of a fertilizer is also recommended, because it has been found in actual practice that there is usually insufficient ash to give the young pasture plants, particularly ryegrass, a good start.

One of the principal difficulties in this method of eradicating hard fern is the packing of water on to the area; but by making some arrangements beforehand—constructing a rough temporary dam below a seep—the distance the water has to be carried can often be considerably reduced. Arsenic-pentoxide spraying is expensive on account of labour costs; but it is the best method known at present to deal with hard fern.

Although in the past the main work has been carried out with the use of arsenic pentoxide, still much remains to be done. Since the main experimental work was carried out a new implement to deal with secondary growth—namely, the flame-thrower—has been perfected; but whether the flame-thrower will give a fierce enough heat to destroy the rhizomes has still to be determined.

—K. M. Montgomery, Te Kuiti.

* "Hard Fern Control by Spraying with Arsenic Pentoxide," Levy and Madden, *Journal of Agriculture*, March, 1932.

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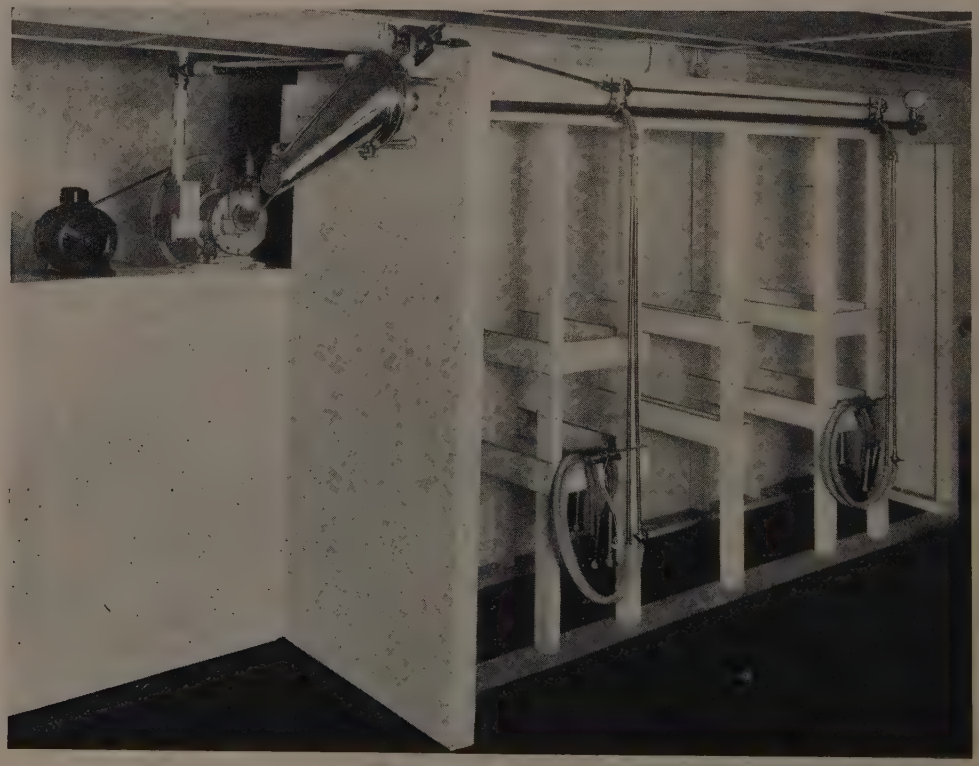

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Pedigree-sow Records.

M. J. Scott, Superintendent of the Pig Industry.

FOR the six months ended the 28th February, 128 sows were recorded, and of this number 86 had litters good enough to be included in one of the five grades set out below :—

Grade.	Litter Weights.	
	At Three Weeks.	At Eight Weeks.
	Lb.	Lb.
1	120	360
2	100	300
3	90	270
4	80	240
5	70	210

As was pointed out in the first annual report (*New Zealand Journal of Agriculture*, November, 1937), many litters excelled at three weeks but failed at eight weeks (or *vice versa*), and on that account received a low grade—*e.g.*, a litter weighing 126 lb. at three weeks and 268 lb. at eight weeks gets only a grade 4. Better attention on the part of the owner can get a grade 1 for such a sow without much difficulty. In the following lists owners are reported in alphabetical order, under breed of sow owned. The numbers following a man's name are in pairs. The first number refers to the herd-book number of the sow, the second to the grade of the sow. A summary is given at the end of each breed.

Berkshires.

Barnaby, F. J., Rongotea, 11579/3; Barnett, A. L., Leeston, 11962/3, 11455/5; Burmeister, O. P., Kairanga, 11671/2; Canterbury Agricultural College, 11888/3; Cheltenham Dairy Co., 9707/2, 9504/5, 10297/4, 9344/2; Jones, E. J., Eureka, 11900/1; Ormond Pig Club, Gisborne, 12806/4; Parkvale Pig Club, Carterton, 9564/5; Revell, A. W., Mangatoki, 10003/5, 11712/2; Stewart and Kerr, Onewhero, 12049/5.

Summary : Number of Sows in each Grade.

Grade 1	1
Grade 2	4
Grade 3	3
Grade 4	2
Grade 5	5
Below Grade 5	11
Total sows	26

Large Blacks.

Boland, Mrs. R. A., Longford, 1342/3, 640/3; Cheltenham Dairy Co., Feilding, 1112/3; Conway, E., Longburn, 1507/4; Hall, G. D., and Sons, Otorohanga, 1412/2; Oliver, Mrs. A. B., Lepperton, 1404/4, 1271/5, 1157/3, 1090/5; Pederson, N. P., Palmerston North, 1109/3; Whitelock, G. M., Palmerston North, 1320/5.

Summary : Number of Sows in each Grade.

Grade 1	Nil
Grade 2	1
Grade 3	5
Grade 4	2
Grade 5	3
Below Grade 5	4
Total sows	15

Large Whites.

Candy Bros., Pokuru, 4698/4, 4777/2; Canterbury Agricultural College, 3637/2, 4715/2, 4765/1, 4131/3; Cheltenham Dairy Co., 4416/2; Feilding Agricultural High School, 4599/2; Johnson, H. E., Whangarei, 4776/4, 4775/2; Norsewood Pig Club, 4860/1; Rowlands, T. E., Kaiapoi, 4814/3; Whitelock, G. M., Palmerston North, 2486/4, 4546/1; Williams, A. E., Kaiapoi, 3195/4, 4163/1, 4437/1, 4164/1.

Summary : Number of Sows in each Grade.

Grade 1	6
Grade 2	6
Grade 3	2
Grade 4	4
Grade 5	Nil
Below Grade 5	5
Total sows	23

Tamworths.

Canterbury Agricultural College, 7185/5, 8949/2, 6212/4, 4131/3; Cheltenham Dairy Co., 6761/4, 3304/5; Fieldhouse, H. E., Rongotea, 7314/5, 8758/2; Feilding Agricultural High School, 4514/4; Foreman, H. J., Alton, 5181/3; Gillett, G. E. and P. G., Sefton, 6775/5, 7729/2, 7730/3, 9666/4, 8295/5; Glen Oroua Pig Club, 8479/4; Golden, A. G., Eketahuna, 7374/2, 9409/4; Hunt, C. S., Glen Oroua, 8926/4, 8712/5, 8921/4, 8922/5, 8923/5; James, H. W., Whangarei, 8540/3; Kopane Pig Club, 5625/2; Massey Agricultural College, 3101/5, 8301/3, 8518/5, 8517/4, 9456/3, 8541/4; Morrison, D. G., Maungatapere, 4206/5; Ogle, F., Normanby, 7193/3, 7194/4, 3209/5; Rowlands, T. E., Kaiapoi, 3415/2; Stewart and Kerr, Onewhero, 9119/5, 7407/3; Suter, E., Waiau Pa, 8761/3, 4450/1, 9029/2; Swaney, A. J., Whatawhata, 8461/1.

Summary : Number of Sows in each Grade.

Grade 1	2
Grade 2	7
Grade 3	9
Grade 4	11
Grade 5	13
Below Grade 5	22
Total sows	64

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Factors in Successful Farming.

(3) Economic Valuation of a Farm.

W. N. PATON, Senior Investigational Officer, Accounts Division.

LAST month's article of this series dealt briefly with the various main points to be considered in buying a farm, but did not touch on how certain things are to be expressed in terms of value. The purpose in this instance is to set out a method incidental to farm-valuation for the prospective purchaser in order that he may avoid the possibility of paying an uneconomic price.

It is desired to make it clear at the outset that the method advocated is intended solely for the purpose named, and not for purposes of general land-valuation. Space will not permit going into matters to any great length, but will suffice to convey a sufficient outline of the basic steps involved, such that the individual may be enabled readily to elaborate the details for himself. Educationists claim that self-educative methods prove to be best in the long-run, and thus, despite any shortcomings, it is hoped the purpose in view may be successful.

The Personal Factor.

In the preceding article it was advocated that a prospective purchaser of a farm should accept as a basic factor that the economic price to him needs to be computed not only on the farm itself, but also on his personal ability. The point is of particular importance when the purchaser happens to have less farming experience than the vendor. Failure to recognize this simple fact and to make the necessary allowance has spelt disaster to many a farmer. Ruling values for farming-land are in terms of average farm-management ability, and hence adjustment for the personal factor is relative to the general standard. In this way one man can afford to pay more than another if necessary, and yet not go beyond an economic price. Unfortunately, it is not possible to provide a numerical formula for such purposes. The best that can be done is for the purchaser to see to it that the price is sufficiently favourable. The prospective purchaser, therefore, must endeavour to properly and candidly size up how he compares in ability not only with the general average, but also with the vendor. Apart from such things as farming knowledge and experience, age, health, physical fitness, education, business ability, and general acumen, consideration must be given to the family labour available (in particular of full-time males), and ability represented in same. It is probably not out of place to mention here that education, acumen, and business ability are increasingly important, since latter-day farming definitely can be said to have entered the scientific stage. As a final word under this heading, it is not a matter merely of being industrious, but rather one of being efficiently industrious.

Gross Earning-capacity.

Apart from what scope may be seen in rapid improvement of a farm (and in this avoid being optimistic), the price to be paid should always be in terms of conditions as they stand with little, if any, allowance for future possibilities, which in the long-run may prove all too elusive. Taking the viewpoint of a live-stock farming proposition, it is a question of estimating how many head it will carry in the first season. On this, the best base to adopt is the productive unit, such as the number of milking-cows or breeding-ewes. This is where knowledge, experience, and familiarity with the district comes to one's aid. Again, do not be optimistic. If any uncertainty is felt in this assessment, then seek out all the information from reliable quarters available, and guard against the possibility of colouring by the vendor or his agent. Once this point is satisfactorily settled, assess production per milking-cow or breeding-ewe. Should the proposition be one as a going concern, get permission to obtain records of sales of butterfat or stock from the various quarters concerned. The prospective purchaser should not entirely depend on his judgment of stock, however experienced he may be, and he should exercise particular care in any comparison made with the stock-management ability of the vendor. Where stock are being procured elsewhere, some reliance on judgment may be necessary and allowance made in any available evidence or productive ability for the differences in the farms concerned, especially where they are situated in different districts. Allowance has to be made for young stock for replacement, herd or flock sires, and any other classes of stock involved. Having gauged the productive capacity of the farm, its gross income can be assessed from a knowledge of average prices of the farm products concerned. Finally, the effect on the position revealed of a possible early fall in prices should be studied, and if deemed advisable make provision for that contingency in the purchase agreement.

Working and Maintenance Costs.

The best way to ensure obtaining a complete assessment under this heading is to make a list of all the items concerned, including casual and temporary labour and all overhead items, but excluding all permanent labour costs.

Personal and family wages also have to be excluded from this section. Naturally, familiarity with such details is necessary, and careful judgment has to be applied in order that assessment in each and every item is reasonably correct. A good method is to obtain a standard list of the items to be covered, together with average data for the district and type of land and management practice necessary. Unfortunately, not all common kinds of farming (for all main districts) have been covered by official economic studies, but, nevertheless, these deficiencies in cases can be made good either from other reliable sources or by adapting data not far removed from the case concerned. Care should be taken to see that items peculiar to the district are not omitted. If the work of assessment or modification of suitable data is done reasonably well, errors on the whole are likely to be compensatory, and thus the total obtained be substantially correct.

Labour Costs.

Casual and temporary labour having already been taken into account in working and maintenance costs, it is now necessary to assess the number of hired hands or paid family workers required to perform the work. Exclude here self or other working members of the family not on wages rates. Knowing the number to be paid wages and the respective rates involved, the total can be readily assessed. Allowance for board and lodging and labour insurance must not be overlooked.

Living-expenses.

This item covers all drawings for living-expenses of owner and all family members not charged board and lodging. Here, again, be careful neither to omit nor duplicate any legitimate items.

Insurance, depreciation, and repairs and maintenance of the dwelling and contents, and interest on contents, are brought to charge here. Interest on the dwelling comes under the following section.

Capitalizing the Balance.

From the total assessed farm income deduct the sum of all the expenses covered in the three preceding sections, and divide one hundred times the difference obtained by the current rate of interest. This is called capitalizing the balance, and provides the total capital value of the farm as a going concern—that is, with all live-stock and farm chattels included. This amount is the assessed total upon which the farm as a proposition to the prospective purchaser should be able to bear full interest charge.

Deducting Value of Stock and Chattels.

Total value of all live-stock and farm chattels—that is, all those farm items which have to be provided separate from the farm—is the next assessment necessary. Once this has been properly assessed, deduct it from the total capital value (as a going concern) obtained in the preceding section, and the remainder is the economic value of the farm and fixed improvements. Now divide by the number of acres concerned, and you have the economic value (to you personally) per acre of the farm in question. Should the proposition under offer be one as a going concern, then stock and chattels have to be included. If the proposition is on a rental basis it is necessary to deduct from expenses any items that are to be paid by the owner, such as rates, land-tax, insurance, depreciation, repairs and maintenance of dwelling and other farm buildings, &c., as the case may be, and follow through the procedure as before up to the point where the balance is obtained. From this balance deduct interest on stock and chattels, and this amount indicates what rental the farm should be able to earn.

Special Adjustments.

In instances it is advisable to deduct from the economic value obtained by the method outlined arbitrary amounts for certain disadvantages which may pertain to the proposition in question, such as lack of or poor accessibility to social amenities in the district. Fixed improvements may be in poor condition or somewhat lacking, and the extent of the shortage in this respect which will need to be made good as early as possible needs to be deducted from the total price. Take the case where there is no house at all. The cost of a homestead of the average proportions and standard necessary should be deducted from the economic price obtained by the assessment method outlined. On the other hand, the homestead on the farm under offer may be far more expensive than is necessary. This extra value has no influence on the earning-capacity of the farm. The farmhouse of round about the usual value has a bearing on productive capacity, in so far as it facilitates efficient management and provides the necessary conveniences.

The system of valuation being discussed does not have regard to the value of the farmhouse, except that it is one of the regular units comprised in the farm as a composite whole. Should a purchaser care to pay the extra value that may be represented in a bigger and more expensive house than is normally deemed necessary, that is his own concern. It, of course, decreases the rate of return he can expect from his investment. Allowances also have to be made for such things as heavy rates, poor roads, lengthy transport, &c., as referred to in the preceding article.

An Abridged Example.

In order that the foregoing description of the method may be more readily followed, an abridged example of an hypothetical case of a dairy farm is given :—

£40 per acre or less and render it possible to be worked successfully at the rates of receipts and expenditure employed. Paying a hired hand £180, say, a year would leave £240 to the farmer, his wife, and family for living-expenses. With an equity of, say, £1,250 in the farm and £1,080 in stock and chattels and a mortgage for the balance at, say, 5 per cent. allows £116 5s. as interest on personal capital invested. This amount, together with the £240 allowance for living-expenses, provides a total net income of £356 5s. Some of this amount should be set aside as reserve for farm-development and for herd-improvement. Included in working and maintenance expenses taken into account is an amount of approximately £60 for depreciation, which also needs to be put to reserve.

On the assumptions made, the value of the farm as a going concern would be £4,800 and the amount of capital required by the purchaser would be, in all, £2,330—£1,250 farm equity plus £1,080 for stock and chattels. The capital value of household and personal effects have not been taken into account. If bull and boar depreciation is accepted in general as being offset by receipts from the sale of bobby calves, skins, hides, cull cows, and cull pigs, &c., neither of these items need be taken into account

Economic Valuation of a Dairy-farm.
(Abridged example—hypothetical case.)

	Per Farm.	Per Cow.
	£	£
Sixty milking-cows at 240 lb. of fat each at 1s. 2d. per pound, say	840	14
Pig returns at 2d. per pound of fat, say (gross return)	120	2
Gross income on 14,400 lb. fat at 1s. 4d. per pound	960	16
Working and maintenance costs at 5d. per pound of fat, say	300	5
Cash wages and living-expenses at, say, 7d. per pound of fat	420	7
Combined expenses total	720	12
Gross income, less combined expenses	240	4
Capitalization of balance $\frac{240 \times 100}{5}$—*i.e.*, at 5 per cent. interest, say	4,800	80
Value of all live-stock (inclusive of horses and pigs) at £11 per cow milked	660	11
Value of implements, plant, and equipment (chattels) at £7 per cow milked	420	7
Combined total of stock and chattels	1,080	18
Capitalized balance, less stock and chattels	3,720	62

If the area of the farm is taken at 93 acres, then the economic value of land and improvements per acre for the case in question is £40 $\left(\frac{£3,720}{93}\right)$. In other words, this farm can be bought at

(and they have been ignored in the example given). Where all replacement stock (both cows and pigs) are raised on the farm, the manifold advantages of such a practice may be said to offset any depreciation on productive stock that

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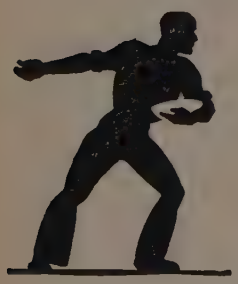

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might otherwise be chargeable, and such possible depreciation has not been taken into account in the example. It must be clearly borne in mind that in the example used all young stock for replacement are taken as being raised on the farm. Therefore the incidental working and maintenance costs on this score are included. Interest on the extra amount of land necessary to carry replacement stock is accounted for also. Had the example chosen been one where all replacement stock were purchased, either the acreage would have been less for the same sixty cows or else more cows could have been carried on the 93 acres. Working and maintenance costs for pigs (inclusive of pig-food purchased) are included with the corresponding item for cows, so that the pig return at 2d. per pound of butterfat represents a gross pig return.

For the intending purchaser who feels for various reasons he cannot accept one or more of the various standards employed in the example, modified calculations will be necessary. The example as set out is purely of a skeleton nature and illustrative of the method advocated. Details have been considerably simplified by adopting convenient factors throughout in order that arithmetic calculation is facilitated. It must be noted that the method employed is such that interest on personal equity is allowed for in all cases, and thus normal living-expenses do not cut into this amount. If, on the other hand, the farmer is prepared to draw on interest or personal equity to some extent, the formula has to be modified accordingly. In the right-hand column of the tabulated example details are set out on a per-cow basis, which essentially is the best basis for estimation purposes to employ in the case of a dairy-farm. In the case of a sheep-farm the corresponding base is that of a breeding-ewe. It can be very misleading to speak of farm-values in terms of an acre without at the same time bearing in mind average carrying-capacity represented. If farm-values are viewed in terms of a producing unit, many difficulties will be simplified. It is earnestly requested, therefore, that this viewpoint be adopted; also, as a very informative exercise, it is suggested the example be reworked altering the value of butterfat (by 1d. intervals) up and down from the 16d. basis given for a range of, say, 6d. below, and, say, 3d. above. There is little doubt that the variations in the final result brought about by employing different butterfat values will prove to be illuminating to any one who has not hitherto familiarized himself with this aspect of the matter.

Grading of Malting-barley.

IN the *Journal of Agriculture* for April, 1937, an account was given of barley-grading systems as adopted in the more important barley growing or consuming countries, and a table was published showing the standards formulated by the Barley Advisory Committee on a tentative basis for the 1937 season.

During the past year further consideration was given to this problem by the Barley Specialists' Committee, and a large number of samples were submitted for examination at the Seed-testing Station, Palmerston North.

The following table shows the official standards as adopted by the Barley Advisory Committee for the 1938 season :—

Grades of Malting-barley.

	No. 1 Grade shall be dry, plump, bright, sound, clean, and free from other grains.	*No. 2 Grade* shall be dry, plump, sound, reasonably bright but not stained, reasonably clean, and free from other grains.	*No. 3 Grade* shall be dry, plump, slightly stained, and reasonably free from other grains.	*No. 4 Grade* must be reasonably dry, plump, and reasonably free from other grains; may be stained and weathered.
The maximum allowance permitted in each grade shall be as under (percentage flinty grains to be expressed by count, all other percentages being in terms of weight) :—				
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Flinty grain	10·0	20·0	35·0	50·0
Foreign matter (weeds, chaff, straw, &c.)	0·5	1·0	2·0	2·0
Wild oats	0·5	1·0	2·0	2·0
Skinned and broken grains	2·0	4·0	5·0	5·0
Tares and other round seeds	5·0	5·0	5·0	5·0
Sprouted grains	Nil	Nil	Nil	3·0
*Moisture	15·0	15·5	15·5	15·5
Bushel weight	52 lb.	51 lb.	50 lb.	50 lb.
Disease	Trace	Trace	Trace	Trace

* A sample of barley containing more than 15·5 per cent. moisture, if it conforms otherwise to any of the grades specified, shall be accepted as being in that grade, subject to a mutually agreed upon deduction for conditioning when necessary and that a deduction in weight will be made to bring the line in conformity with the standard of moisture reached by the line after conditioning.

Prior to grading all barley shall be screened through a 6A screen. The maximum amount of screenings permitted for malting-barley shall be 20 per cent. Screenings under 20 per cent. subject to dockage at the rate of ½d. per bushel for every 2 per cent. over 5 per cent. On tares and round seeds left in the screened sample there shall be a dockage deduction on a weight-percentage basis at the rate of ½d. per 1 per cent.

The maximum district price is payable in respect of No. 1 Grade only. The price for No. 2 Grade is 3d. per bushel lower, the price for No. 3 Grade is 6d. per bushel lower, and the price for No. 4 Grade is 9d. per bushel lower than the maximum district price in each case.

The following points in connection with these official standards should be noted :—

(1) With the exception of those relative to flinty grains, all grading percentages are to be calculated from the total weight of the screened sample, and to be the average of not less than three separate analyses.

(2) *Screenings.*—A 5 oz. sample is to be screened through a 6A screen and dockage in accordance with the grading standards to be made from the standard price for the district in which the line is graded.

(3) *Flinty grains.*—To be estimated with the use of a suitable grain-cutter. The final percentage to be the average of at least three separate cuts and to be expressed *by count*.

Three classes of cut grain are evident in the average sample—

(*a*) Grain hard and completely flinty.

(*b*) Grain partially mellowed — part flinty and part floury.

(*c*) Grain completely mellowed or floury.

For the purposes of grading in respect of allowable percentages of flinty grain, only class (*a*)—completely flinty—are to be counted as such, classes (*b*) and (*c*) being grouped as floury.

(4) *Broken and Skinned Grains, Foreign Matter, &c., Wild Oats, &c.*—The respective quantities of each are to be separated from the screened sample, the percentages arrived at by weight, and the barley graded as prescribed by the standards.

(5) *Tares and Round Seeds.*—To be separated from the screened sample and a dockage deduction on a weight basis according to the grade to which the line conforms.

(6) *Moisture.*—Determined in accordance with the Carter-Simon method.

(7) *Bushel Weight.*—Estimated by the use of a chrondometer in the ordinary way.

(8) The Grain Merchants' Association's trading rules will apply in connection with all deliveries.

(9) *Disputed Samples.*—The party disputing the quality of the grain as determined by either the agent of the purchasing firm or by the grower may have the line submitted for official grading, in which case he makes application to the Fields Superintendent, Department of Agriculture, at Dunedin or Christchurch (as the case may be), on forms which are obtainable from officers of the Department of Agriculture in the main barley-growing areas. The application must be accompanied by a grading fee of 10s. On receipt of the application and fee the Fields Superintendent will arrange for an official 1 lb. sample of the line to be drawn, sealed, and sent to the Seed-testing Station, Palmerston North, for official grading. The sample will be graded strictly in accordance with the grading procedure laid down, and the disputing party will be advised of the correct grade. If the contention of the party disputing the quality is sustained, the other party will be liable for the grading fee.

Barley-prices for 1937-38 Season.

Fields Division.

THE growing of barley for the season 1937–38 is rendered more attractive by the establishment of a higher scale of prices for grain of malting quality. The scale of prices applicable to the 1937–38 crop was drawn up by direction of the Hon. the Minister of Agriculture after consultation with representatives of barley-growers and of the principal buying firms. The prices scheduled below are the minimum prices which have been agreed upon for No. 1 grade malting-barley (stack-threshed) :—

	Per Bushel. s.	d.	
Central Otago ..	5	4½	(on trucks).
Southland (Garston)	5	0	(on trucks).
Canterbury and North Otago	4	10½	(on trucks).
Marlborough and Nelson	4	10½	(in store).

Stack-threshing.—It should be noted that in the case of Central Otago and Southland districts the period during which the barley must remain in the stack prior to threshing is at least six weeks. In all other districts the period during which barley must be in stack prior to threshing is eight weeks.

Stook-threshing.—In all cases where a grower in any of the districts threshes his crop out of stook, a deduction in price of 3d. per bushel on the stack-threshed prices stated above may be made.

The following prices will therefore apply for stook-threshed barley :—

	Per Bushel. s.	d.	
Central Otago grown	5	1½	(on trucks).
Southland (Garston)	4	9	(on trucks).
Canterbury and North Otago	4	7½	(on trucks).
Marlborough and Nelson	4	7½	(in store).

Contract Prices.—Where contracts were placed for barley at prices lower than those stated above, there shall be payable to the grower by the purchaser a bonus representing the difference between the contract price and the district price stated.

Injury to Malting-barley at Threshing.

COMPLAINTS are frequently made by brewers and maltsters of the injury done to barley in the process of threshing, owing to the fact that the drum of the threshing-machine is set so close that many of the grains are cracked or broken. The presence of such injured grains greatly reduces the value of the barley for malting purposes, as the broken, bruised, or skinned grains fail to germinate, and soon show signs of mould, thus leading to unsoundness in the malt and bad results in the brewery. The injury caused by overdressing is not limited to grains which are actually broken ; grains which have been damaged at the germ end, bruised, or cracked are equally objectionable—in fact, if by too vigorous threshing the husk of the barley is damaged, although the damage may not be apparent, irregularities in the malting, accompanied by the production of mould, are likely to result.

Much damage can be obviated by giving consideration to the following :—

(1) When farmers commence a day's threshing they should at the outset, and

1 per cent. skinned and broken grains.

repeatedly during the day, carefully examine the grain. If any signs of damage are observed, the concave of the drum of the machine should be slightly opened or such adjustment made to the machine so as to leave a little awn on the grain. It may be necessary to make several adjustments during the day, especially when threshing out of the stook. It is advisable also to reduce the speed of the drum by 100 to 200 revolutions per minute from that used when threshing wheat.

(2) A new machine will break the grain more than a machine that has been used for some time and in which the roughness of the beaters has been worn off. On the other hand, when a machine has been much worn, the centre of the drum and concave having had the most work in consequence of the feeding being necessarily more in the centre than at the ends of the drum, the space between them is greater in the centre than at the two ends, and if they are set to thresh clean in the centre they will be too close at each end, and consequently damage will occur. This fault can only be remedied by putting on new drum beaters and concave ribs. Even after this has been done it is wise to let the machine do several days' threshing with wheat prior to threshing barley. In the case of the American type "tin" mill, a number of the peg teeth should be removed from the concave before commencing to thresh barley.

(3) Attention should be paid to regularity of feeding, particularly in regard to the spread of the sheaves, and the mill should be driven at an even speed.

(4) It is not only in the drum of the threshing-machine that damage to the grain occurs, but also in the hummeler through imperfect setting. Here, if the beaters are set too closely and the barley roughly handled, damage will take place.

(5) As a further guide in threshing, it may be added that on no account should the barley be rushed through the machine, as it is better to be content with a moderate output and a more perfectly threshed sample.

(6) Threshing should not be designed to obtain a sample of unduly high bushel weight, as such barley does not command a higher price than grain of moderate weight. According to grading standards, a sample going 52 lb. to the bushel will pass as first grade.

(7) It is important that the machine should be thoroughly clean in all parts before commencing threshing.

The importance of good threshing cannot be overstressed. An example of what at times occurs can be instanced in an actual case of Central Otago barley delivered into store this season. This line was submitted for grading, with the result that it was reported on as being below malting standard. The details of the grading figures are as follows (the standards for first-grade barley are given in parentheses) :—

	Per Cent.	Per Cent.
Flinty grain ..	.. 3·0	(10·0)
Foreign matter ..	.. 0·2	(0·5)
Wild oats ..	.. 0·0	(0·5)
Skinned and broken grain	5·7	(2·0)
Tares and other round seeds	0·0	(5·0)
Sprouted grain ..	0·0	(0·0)
Moisture ..	.. 12·3	(15·0)
Bushel weight ..	53 lb.	(52 lb.)
Disease ..	.. Nil	(Trace)

Apart from the broken and skinned grains, due to faulty threshing, the sample is well within the standard for first-grade barley. The faulty threshing has, however, brought the line down to a standard that makes it unfit for malting. Instead of receiving 5s. 1½d. per bushel (stook-threshed) for the line, this grower will have to be content with 3s. or 4s. a bushel for it as feed barley. The line comprised 480 bushels, and the loss to the grower will be at least 1s. a bushel (£24), and will probably be double this figure.

—*J. M. Smith, Dunedin.*

5·7 per cent. skinned and broken grains.

9·8 per cent. skinned and broken grains.

Half-yearly Fertilizer Returns, 1937.

THE following returns have been compiled by the Inspector of Fertilizers, Fields Division, Department of Agriculture, from figures furnished by courtesy of the Comptroller of Customs :—

Fertilizer.	Origin.	July.	August.	September.	Quarter.	October.	November.	December.	Quarter.	Half-yearly Return.
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Phosphates—										
Rock	Gilbert and Ellice Islands	16,606	..	..	16,606	..	552	13,222	13,774	30,380
	Nauru	7,007	29,245	25,651	61,903	15,947	35,141	9,958	61,046	122,949
Total		..	..	..	..	..	..	..	..	*153,329
Slag	United Kingdom	175	300	310	785	325	600	200	1,125	1,910
	Belgium	535	765	1,400	2,700	8,340	4,705	1,750	14,795	17,495
Total		..	..	..	..	..	..	..	..	19,405
Guano	United Kingdom	..	..	..	..	..	..	..	..	..
	New Caledonia	..	..	..	..	..	100	..	100	100
	Seychelles	..	..	..	..	..	..	..	..	..
Total		..	..	..	..	..	..	..	..	100
Other phosphatic manures	Egypt	309	..	..	309	..	..	10**	10	319
	United Kingdom	502	500	..	1,001	300	300	..	600	1,602
	Belgium	25	545	..	570	700	725	..	1,425	1,995
Total		..	..	..	..	..	..	..	..	3,926
Total phosphates		..	..	..	..	..	..	..	..	176,750
Potash—										
Kainit	Belgium	..	..	..	..	..	..	..	..	..
	United States of America	50	..	..	50	..	..	..	..	50
	Germany	10	..	..	10	3	20	30	63	63
	France	..	..	20	20	..	..	..	..	20
Total		..	..	..	..	..	..	..	..	133
Sulphate	France	..	..	15	15	..	..	..	..	15
	Germany	30	53	20	103	174	82	110	366	469
Total		..	..	..	..	..	..	..	..	484
Muriate	France	..	..	..	..	..	..	..	..	..
	Germany	..	8	10	18	5	..	17	22	40
Total		..	..	..	..	..	..	..	..	40
Other	France	125	..	500	625	120	275	50	445	1,070
	Germany	145	..	520	665	171	1,510	165	1,846	2,511
	Belgium	..	..	..	..	..	..	..	..	..
	United Kingdom	..	..	..	..	2	..	..	2	2
Total		..	..	..	..	..	..	..	..	3,583
Total potash		..	..	..	..	..	..	..	..	4,240
Nitrogen—										
Sulphate of ammonia	United Kingdom	1,105	965	270	2,340	350	250	85	685	3,025
Nitrate of soda	United Kingdom	..	..	1†	1	..	..	..	1	1
	Chili	327	152	75	554	175	125	115	415	969
	United States of America	75	51	..	126	..	..	..	..	126
	Other	..	1,330‡	..	..	..	..	..	..	..
			480§	..	1,810	76§	..	..	76	1,886
Total nitrogen		..	..	..	..	..	..	..	..	6,007
Miscellaneous	Australia	..	213	3	216	20¶	50¶	..	70	286
	United Kingdom	31	80	..	111	45	..	2	47	158
	United States of America	1	..	..	1	..	10‖	..	10	11
Total Miscellaneous		..	..	..	..	..	..	..	..	455
Totals		27,058	34,686	28,796	90,540	26,753	44,445	24,714	96,912	187,452

* Equivalent to approximately 300,000 tons of superphosphate. † Norway. ‡ France. § Germany. ¶ Bone char. ‖ Belgium. ** Finland.

Value of Lucerne in North Otago.

T. A. Sellwood, Instructor in Agriculture, Oamaru.

MANY articles have been written on lucerne establishment. This is not so much concerned with the establishment, but more from the point of view of the value of the crop as a permanent feed-supply and also as to the necessity for a marked increase in the acreage in the North Otago district.

North Otago is a district extremely suited to the growing of lucerne, and it is difficult to understand why the North Otago farmers have not given it more consideration in their farming practice. At the present time there are approximately some 3,000 acres growing with marked success in varying localities, and there does not appear to be any reason why lucerne should not be a conspicuous crop throughout the entire district. It would appear that one of the main arguments used by the farmer against the growing of lucerne is that it comes in at a bad time of the year and is costly to handle. To a certain extent the remarks are true, but, at the same time, it may safely be said that the merits of the crop can successfully smother such arguments. The implements required for haymaking, such as elevators, sweeps, rakes, and mowers, are to be found on most farms where haying operations are carried out. If, however, the farmer does not possess an elevator, it is comparatively simple to fit one up. Assuming that the required machinery is on the farm there is no necessity for a further outlay with regard to haymaking implements. In the height of the season it may be necessary to utilize some casual labour.

Baling from the Field.

The practice of baling from the field is one which could be given more consideration where large areas of material are to be handled. Such a practice will allow the material to be saved more expeditiously, while from the point of view of storage it should be most helpful, as a larger amount of food material could be stored without undue inconvenience. Pick-up baler machines are now working in the district, and there is now available a small Massey baler which should be most useful to any farmer growing lucerne. Therefore, the practice of baling direct from the field should facilitate the handling of the crop. There is no doubt, either, that first-class material may be saved provided the crop is cut at a suitable stage of growth. Consequently, it would be wiser to cut the material somewhat on the short side rather than to allow it to develop too strong a growth.

Lucerne is a dry-climate plant, and in North Otago prolonged dry spells are experienced. The fact that only recently one of these dry spells was experienced, and its drastic effects being still very fresh in the minds of the farming community, does not call for further remarks on the part of the writer. Suffice it to say that it would be very difficult for one to imagine any one failing to realize the benefit obtained by those farmers who had established lucerne in the better seasons as against the farmer who was without lucerne and consequently had a very worrying time from the feed point of view for stock. It is therefore under such conditions that this crop comes into its own. There is no disguising the fact that lucerne plays a highly important part in this district as a haying and grazing unit. Very severe grazing is detrimental to the crop, but, on the other hand, no great harm can eventuate provided a certain height of leafy growth is maintained. Even during the recent dry conditions the lucerne areas received a most severe handling, yet with the December rains they came away like magic. These same stands have already given one hay cut and are now well on the way to providing a second cut. Those areas which are able to be irrigated are now producing their third cut. Surely it is a short-sighted policy for any one who has the right conditions not to set aside at least 10 acres of land for such a remunerative crop.

End of Winter Feed.

In North Otago the flush of grass does not come about until late October or early November; sometimes it is later. Lucerne commences its growth in late August - early September and is at the very least six to eight weeks earlier than the grass growth. It is during the late winter and early spring period that lucerne may be valued in pounds shillings and pence. Towards August the hay and root supplies are coming to an end, and if the season has been unfavourable to a good establishment of green-feed crops the very difficult months of August, September, and October may safely be got through due to lucerne. Ewes which are coming to lamb require a good milk flow for their progeny, and, consequently, if green-feed crops are backward, the lucerne may be utilized. Such a practice will prevent any check in the ewes and the young lambs, as they may be successfully grazed on lucerne during the above-mentioned months.

Although such a practice necessitates the grazing of what would normally be the first hay crop, there is still sufficient time left for two more cuts of the hay to be taken off. If the autumn is dry, one cut of hay and another grazing may be obtained, although such heavy grazing may considerably shorten the life of the stand, but it should be able to tolerate such treatment for five or six years. After this period it could be utilized entirely for grazing and should last for another two years at least. The farmer should, of course, take the precaution of having established another stand before allowing the old one to run completely out.

It is a well-known fact that lucerne stands which have been left entirely for haying purposes should be productive for ten years or more. Therefore, if the above treatment reduces the life of the stand to half that period, it has paid the farmer well, because he has had a permanent source of feed for his stock both with regard to hay supplies and grazing. He has also been in a position to maintain his ewes and lambs in good condition during the early spring period. From lucerne his stock will then be able to go forward to pastures showing a good growth. The unreliability of the rape and root crops, due to climatic conditions, diamond-backed moth, and lately the white butterfly, have been responsible for farmers decreasing the areas usually allowed for such supplementary crops and increasing their lucerne areas. During the past two or three years many

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farmers have fattened their lambs on lucerne, this practice having been necessitated owing to adverse climatic conditions affecting rape and root crops.

So valuable is this crop to North Otago that there is room for a large increase in area. Instead of 3,000 acres one would expect to see from 8,000 acres to 10,000 acres of lucerne, and there is no doubt that such an acreage could be successfully utilized. If lucerne were grown to that extent, the question of the provision of winter feed for stock would be largely overcome, and the growers would be in a position to combat the drier periods of the season or seasons, as the case may be. For every 100 acres on the farm, there should be 10 acres allowed for lucerne. Hence, on a farm of 600 acres, there would be 60 acres in lucerne.

In conclusion, for those farmers who are contemplating the sowing of lucerne, detailed information *re* the establishment of the crop may be obtained through the medium of the Department's bulletin "Lucerne on the Farm," or directly through the local Instructor.

Seasonal Feeding of Dairy-cows.

P. S. SYME, Ruakura Farm of Instruction.

WHILE the part played by the judicious management of breeding-stock in the production of high herd averages is generally realized, there is a tendency on the part of many farmers to leave too much to the cow and to overlook certain personal responsibilities in the field of management. To produce well and consistently throughout her lactation period a cow must be adequately fed at all times throughout the year, and a lack of a proper appreciation of this simple axiom frequently results in periods of semi-starvation which prove to be serious limiting factors of production.

If a satisfactory and adequate ration is to be available at all seasons, the farmer must look ahead and, by careful forethought aided by practical experience, render himself independent of the vagaries of the season. He must sow even while he reaps.

The past summer has been more than usually dry. In some districts crops of hay and silage have been light; root crops have been poor, and with heavy demands on the food available in January and February many farmers who failed to carry over sufficient hay and silage from the previous season now face the lean period of the year with food reserves at a very low ebb. This position may best be attacked from two angles—

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(*a*) *By conserving existing supplies and using all feed to the best possible advantage.*

While each farm presents separate problems, certain solutions are common to all. Much may be done by dividing the herd so that the animals may be fed according to their condition and value; the low-producing animals will dry off, and this, combined with early culling, will ease the position for the remainder. Soft turnips, green maize, and other perishable food available should be used to conserve pasture-growth, and if an autumn flush occurs, surplus grass may be used for ensilage. Silage and hay should be fed only very sparingly, unless an adequate reserve is available for winter, as the position then is likely to be still more acute. At the worst the summer food shortage is likely to be temporary, and the ration can be supplemented by purchased foodstuffs such as bran and meat-meal.

(*b*) *By encouraging pasture growth, and providing additional supplementary feed.*

While the season is now too far advanced to permit of sowing root crops with much hope of success, sowings of temporary pasture mixtures will provide valuable feed for the autumn and spring. A temporary pasture of Italian rye-grass and red clover may be ready to feed six to eight weeks after sowing. The best results are obtained by the use of certified seeds, and these should be sown at the rate of 30 lb. Italian rye-grass and 6 lb. broad red clover. Super at the rate of 2 cwt. per acre should be applied at the time of sowing, with a dressing of 10 cwt. of lime if this is considered necessary. A good, well-worked, and well-consolidated seed-bed, combined with early sowing, will materially contribute to successful establishment.

Algerian oats sown at 2½ bushels to 3 bushels per acre will provide some autumn feed and will prove useful for grazing or for hay in the spring. This allows sufficient time to prepare the land for swedes, a practice followed by many farmers. It should be remembered that a small area done well is far more profitable than a larger area which has been allowed to suffer through inadequate attention.

If full advantage is to be taken of existing pastures, selected fields should now be lightly harrowed and top-dressed with 2 cwt. to 4 cwt. of super per acre; and if lime is deficient, this may be added at 10 cwt. per acre. Fertilizers applied at this time, when the soil is still warm, give quick results and greatly increase the quantity of feed available, thus reducing the drain on the feed intended for winter consumption, and still getting the cows in good condition before the winter.

Where ample reserves of fodder are available, supplementary feeding should commence before the grass fails. Considerable injury results to a rye-grass sward if it is grazed too hard in the late autumn. The spring growth of rye is delayed, the balance of grass and clover is upset, and the way is paved for a rapid invasion of bad perennial weeds.

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Seed-wheat Certification.

J. H. CLARIDGE, Certification Officer.

FOLLOWING is a list of growers whose wheat crops have passed both the field and the grain inspections required under the Government scheme for the certification of seed-wheat. The seed from these crops is not recognized as finally certified until it has been satisfactorily machine-dressed and the sacks suitably tagged and sealed. Further tests will be published later.

Variety.	Grower.	Acreage.
Cross 7	Allan, A. T., Waikari (Line B)	30
	Ashton, M. A., Lismore R.M.D., Ashburton	15
	Baxter, S., Kerrytown, South Canterbury	16
	Calder, Geo., Halkett	8
	Davies Bros., Waiau	40
	Greenslade, S., Prebbleton	2
	Jamieson, R. L., Culverden	15
	Johns, D. S., Culverden	17
	Judson, C. J., High Street, Rangiora	28
	McCaw, A. C., Hakataramea	11
	McCaw, J. and F., Hakataramea (Line A)	35
	McCaw, J. and F., Hakataramea (Line B)	33
	Marshall, J. G., "Balraizie," Rakaia	24
	Medlicott, F. S., Hook, Waimate-Hunter R.D	25
	Stewart Bros., Templeton	19
	Talbot, P. R., Claremont, Timaru (Line A)	30
	Williams, R. B., St. Andrews	20
Dreadnought	Medlicott, S., Hook, Waimate-Hunter R.D.	20
	Talbot, P. R., Claremont, Timaru	12
Hunters II	Earl, D. M., Culverden	9
	Evans, H., Upper Plain, Masterton	14
	Murphy, R. J, Pleasant Point	15
	Redmond Bros., Halswell	6
Jumbuck	Berry and Halliburton, Dundas Street, Christchurch	10
	Calder, Geo., Halkett	10
	Paterson, W. T., West Eyreton	12
Solid Straw Tuscan	Hills, C., Whiterock, North Loburn	17
	Johnston, R. H., Dunsandel	55
	Percy, Est., A. J., Te Ore Ore, Masterton	13
	Riches, H., Killinchy	8
	White, G. T., Waiau	25

These growers have had their crops inspected while growing, and the grain harvested from these crops has also been inspected and declared up to the standard required for seed-wheat under the scheme of Government certification.

The list is not complete, but comprises only those growers whose crops were threshed and ready for grain-inspection prior to the end of February. Further lists of growers whose crops also come up to the required standards will be published from month to month.

To those farmers who contemplate purchasing certified seed-wheat a word of caution is tendered. Because a particular line of wheat has been accepted as provisionally certified after field and grain inspections, this seed cannot automatically be recognized as "certified" seed. Before this recognition can be given, the wheat must be machine-dressed up to certain standards of excellence, when the containers are sealed and suitably identified by insert slips inside, and tags outside the sacks.

Purchasers are advised, therefore, when ordering certified seed-wheat, to insist that the seed has been machine-dressed and has been officially sealed and tagged by an officer of the Department.

Many purchasers of certified seed-wheat will be contemplating re-entering their own crops into certification. In this respect certain precautions as outlined below should be observed in order to preserve the maximum chances of qualification next season:—

(1) Purchase certified seed as described above.

(2) Do not expect your crop to pass certification if it is sown on weedy land (particularly wild oats or tares) or land that may be carrying self-sown seeds of oats or other varieties of wheat.

(3) Sow only one variety of wheat in a paddock (unless the varieties are separated by some crop other than wheat).

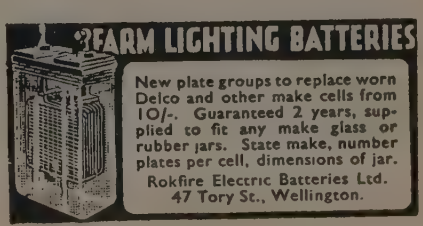
(4) See that the drill is thoroughly clean before commencing to sow, to prevent the introduction into the crop of impurities.

(5) Retain the insert slips which will be found within the sealed sacks. These slips should be forwarded to the local Instructor in Agriculture with your application for certification, preferably by the beginning of November next.

(6) If your crop passes the field inspection, see that the threshing-mill is thoroughly cleaned out before commencing to thresh your crop. Mark and place on one side the first three and the last three sacks of wheat obtained in the threshing of the paddock.

It is by no means certain that, because certified seed-wheat is sown, a crop of certification standard will result. In addition to the above points other factors uncontrollable by the farmer may have a bearing on the result. Principal amongst these are the natural increase under certain conditions of foreign varieties and of loose smut and the effect of weather conditions in producing a sample unfit for seed purposes.

Of course, all farmers, whether sowing wheat with the intention of either a seed crop or a milling crop, should treat their seed for the control of stinking smut (covered smut or bunt). The treatment which is recommended by the Department is the dusting method, using either Agrosan or Ceresan. This treatment is, however, as is the case with all chemical treatments, ineffective in the control of loose smut. The only practical safeguard for the farmer in respect of this disease is to purchase certified seed-wheat.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Truck Farming at Pukekohe.

J. E. BELL, Instructor in Agriculture, Fields Division.

(Continued from February Issue.)

THE early potato crop normally takes four months and three weeks to mature, and is dug from September to December. If the produce is dug much earlier than this, the yield is light and the inner skin darkens. It usually takes two months for the plants to appear above ground. The period of maturity, however, is affected by the state of the seed. If the seed planted is more forward, the plants will appear above ground earlier and the crop will mature at an earlier date. If frost attacks the potato in the early stages it will recover and produce a fair crop. The maturity is not greatly affected, but the yield is, and the digging has to be delayed so that a high enough yield is obtained. If frost attacks the crop when it is well forward, its vitality is so seriously affected that it should be marketed at once, for it will recover to a very small degree if left growing.

The early crops do not flower and are dug when the leaves have ceased to make further growth and yet when they are still quite green. Except on the larger and more level areas where the shovel-nose elevator type of digger is sometimes used, the potatoes are dug by hand. Two rows are dug together and the green tops are placed alongside the row of dug potatoes. Very little earth adheres to the potatoes although the early crop is dug in a period when showery weather and often heavy falls of rain are experienced. The potatoes are left on the ground for an hour or so to dry and harden the skin before picking up commences. The picker-up ties a bag to his middle and drags it between his legs so that both hands are left free to pick up the produce. The potatoes are usually separated into two grades, but the very early crops are sometimes classified into three grades. They are placed in sugar-bags. Care is taken not to expose the produce too long to the greening effect of the sun. Until the bags are sewn the exposed produce is protected from the sun by a covering of potato-tops. Usually the potatoes are carted from the field by motor-lorry the day they are harvested and taken direct to Auckland or put on rail at Pukekohe to be sent to Auckland or more distant places all over New Zealand. The new potatoes are easily bruised and rubbed, and often not sufficient care is taken in handling them after digging.

Methods of Sale.

Some of the potatoes are sold to the local merchants, who resell them to retailers or merchants in the smaller centres. When the demand is great, however, they are mostly sent into auction markets belonging to different merchants in the larger centres, where they are sold under the hammer to local retailers. The sooner the potatoes are retailed the better for grower and middleman, for the trend of early-potato prices is generally downwards and the produce loses rapidly a small percentage of weight for a short period after digging. The grower receives about £30 per ton in mid-September, about £14 per ton in mid-October, and £8 per ton in mid-November. The prices vary from year to year dependent on the supply on the market and the quantity and quality of the old potatoes from the South Island. From December onwards the price remains fairly stationary at about £5 per ton. Yields vary from season to season dependent on the growing conditions in the early spring. Cold weather, severe wind, hail, and frost all limit yields, while warm, mild conditions make for high yields. The average yield varies according to the earliness of the crop, being 2 tons to 3 tons per acre in September, 4 tons to 5 tons in October, and 7 tons or 8 tons in November. By the end of October the supply of early potatoes is large and reaches the total of over 200 tons daily from Pukekohe and the price falls sufficiently to make the early potato an attractive buying proposition to the economical housewife in the North Island. By that time, too, the old potatoes are scarce and of poor quality due to sprouting or disease.

After the early crop is sold, the grower tine-harrows the field to destroy weeds, to level the ground, and to gather the potato-tops. The tops are burnt or dumped on the headlands. The land is then ready for the next crop, which is usually potatoes. The sound, discarded potatoes "kept over" from the planting of the early crop may be planted immediately and the remainder of the ground is left fallow for three to four weeks and is planted with seed selected from the digging of the early crop. The former

FIG. 1.—A panoramic view of Pukekohe Hill from the west. The slopes of the hill are chiefly under crop, mostly potatoes and onions interspersed with fields of pasture. Two or more crops are grown annually on the same ground.

crop is called a "kept-over" crop and comes on the market in January and February. The seed is, of course, well forward and has long sprouts. This seed is not cut or snipped, but is planted whole, except perhaps for some unduly large sets which are split. The sets are spaced 15 in. in rows 28 in. to 30 in. apart. About 10 cwt. of fertilizer, mainly phosphate, is applied per acre—generally super or super and bonedust. The potatoes soon appear above ground and the crop grows rapidly, being marketed after flowering when the top has ceased to make further fresh growth and some of the lower leaves are becoming yellow in colour. The cultivation given is similar to that given to the early crop. The operations, however, have to be carried out much more rapidly, as the quick growth of tops and roots soon extends across the furrows. Spraying receives careful attention if the summer is wet.

A heavy attack of late blight sometimes forces the early digging of the crop. Yields usually are about 8 tons per acre. All the produce from the "kept-over" crop is marketed. Seed from it is not recognized as suitable for the planting of the next early crop. If it is so used the crop matures very early, but the yield is generally disappointing. The produce is sold in sugar-bags mainly in the Auckland market. Lately owing to the increased production of potatoes of the Aucklander variety from the Ohakune district, the growing of "kept-over" crops has declined.

The crop planted with seed selected from the digging of the early crop is called the "autumn" crop because it matures in March and April. The seed for this crop receives the same meticulous attention and treatment accorded to that for the planting of the early crop. Large and small seed are employed. Generally the larger the seed the better the growth of top and the greater the yield. The planting and cultural work is the same as for the early crop. The spraying requires most careful attention—more than for the early or "kept-over" crops. When the crop is near maturity the spraying must be applied heavily, and in seasons of heavy growth and bad blight attack some growers increase the mixture to 6 lb. of bluestone and 8 lb. of soda to 40 gallons of water in an endeavour to check the heavy growth of the tops and the late blight. No attempt is made to destroy the tops by scything off or spraying with bluestone or sulphuric-acid solutions as is reported to be a new practice when the disease appears in the Jersey Island and England.* It is recognized that complete destruction of the leaves will result in lowered yields, and it is much better to spray to destroy blight and preserve the leaves as much as possible. This crop flowers and is dug at the same stage as for the early crop and at an earlier stage than the "kept-over" crop. Yields average about 8 tons per acre. The main purpose of growing the "autumn" crop is for the production of seed potatoes for the following early crop to be planted about two months after digging. The grower selects from the "autumn" crop his

FIG. 2.—Digging the early-potato crop. Gangs of Maoris dig and pick up the potatoes. The grower generally supervises and sews the bags.

* "The Control of Potato Blight in Jersey," T. Small, Ph.D., A.R.C.S., States Experimental Station, Jersey. *Journal of the Ministry of Agriculture*, March, 1937, Vol. XLIII, No. 12.

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seed-requirements and sells the remainder either for human consumption or for seed, which is much in demand and worth about £8 per ton. Generally he sells the produce from the crop planted with small seed and selects seed from crops planted with large seed. The potatoes for human consumption are marketed in sugar-bags, while seed potatoes for sale are packed in fertilizer-sacks. The seed for planting the next early crop is stored loose on a floor in a shed or under a house. After a while it is picked over and diseased tubers are discarded while poorly shaped tubers are put on one side for the next "kept-over" crop.

After the "autumn" and "kept-over" crops are dug, the ground receives two months or more rest and the time is frequently utilized in growing a crop of mustard for ploughing in when planting the following early crop. The mustard-seed is broadcasted immediately after the crop is dug at the rate of 20 lb. per acre, no fertilizer being used, and is covered by tine-harrowing and boarding. The crop of mustard is usually 2 ft. 6 in. high when the time comes for planting. Before planting, the crop of mustard is crushed flat by running a clod-crusher over it in the direction in which the plough will be travelling. The mustard is then quite easily pulled into the furrow by means of a chain attached to the beam of the plough so that the chain lies across the ground as it breasts the mouldboard of the plough. The chain is made long enough to allow the end to lie under the furrow as it falls into place. By this means the chain is kept taut and presses the mustard close to the ground as the furrow turns over and thus almost completely buries it. Mustard-plants that are not completely buried continue to grow and are the cause of some trouble in the following early potato crop which is planted as the ploughing-in of the mustard proceeds. Sometimes the crop is too tall or too tangled to deal with by this easy method and it has to be cut by a mowing-machine and forked into the furrow. The effect of a mustard green-manuring crop is, of course, to increase the humus in the soil. Also before it decomposes (which it does very rapidly) it aids in the drainage of the soil, which is inclined to be wet in the winter.

Two Crops a Year.

I have described a year's programme, beginning at the planting of the early crop, describing its growth, the growing of the following "autumn" crop or "kept-over" crop, as the case may be, and finally the growing of the green-manuring mustard crop. Both potato crops are grown out of season, the early crop in the winter, and the second crop in the summer and autumn when the weather is frequently dry. The method of growing potatoes as described above has evolved during the past ten to fifteen years. It is suited to the climatic conditions, for on Pukekohe Hill potatoes growing wild will produce two crops yearly. On account of the mild winters and the quick sprouting of the seed it is not feasible to grow one crop per annum and maintain vigorous seed.

FIG. 3.—The "kept-over" crop. Photograph taken on the 2nd December. This crop is planted as soon as possible after the early crop is harvested. This crop probably was planted in October and will be ready for harvesting in January.

Though the Northern Star is a variety much despised in other parts of New Zealand it is most suitable for the Pukekohe district, for it sprouts readily soon after digging, is hardy in winter, and in a fairly good measure resists late blight. Its habit of forming numerous small tubers is not a great objection either in the early crop, which is used for early table potatoes, or in the autumn crop, which is grown chiefly for seed. The Northern Star is a main-crop potato. So far no tried early-potato variety has grown satisfactorily at Pukekohe. The planting of them cannot be timed to produce a marketable crop as early as the Northern Star. In this respect Pukekohe does not differ from the Channel Islands, Spain, or the North African coast in the Northern Hemisphere, where early main crop varieties are grown to supply the first potatoes reaching the London market.

Enemies of the Potato.

The potato is attacked by many foes.—by insects, fungi, and bacteria. The potato-plant, like animals, has a protective skin all over it, including its leaves, stems, and tubers. This skin has to be broken for the entry of some organism before it can do harm. Often the insect biting the plant allows the entrance of fungi, which are followed by bacteria, or the fungi alone or the insect alone is responsible for the entrance of bacteria which, unaided, seldom harm the plant. The insect favours the warm summer and dry weather for its operations, the fungi warm moist weather, especially prevalent in the autumn and wet summers. Bacteria favour warm conditions.

The chief insect enemy of potatoes at Pukekohe is the caterpillar of the *Lita solanella* moth which first appears in December fluttering in the potato fields. It lays its eggs in the axils of the leaf-stalks of the potatoes and in the eyes of the potato tuber wherever they are exposed. The moth disappears with the winter cold of May, and from January to April the grower must pick up dug potatoes quickly and bag them before this moth can lay its eggs on them. At the same time he should give his potatoes an occasional spraying with arsenate of lead, 1 lb. to 50 gallons of water, to kill the young caterpillars as they hatch and before they commence to burrow into the stalks and between the upper and lower skins of the potato leaflets. The eggs laid by the moth in the eyes of the tubers also hatch very rapidly, and the caterpillar eats its way via the eyes into the tuber. Once inside the caterpillar burrows holes, literally riddling the tuber. Seed attacked in this way are useless for early planting, because the vestigial sprouts in the eyes of the tuber are destroyed temporarily and the tubers are liable to secondary attack of fungi and bacteria in the channels made by the caterpillar. If use must be made of the still sound tubers they can be employed when the eyes throw fresh sprouts, but misses are very liable to occur due to rotting diseases. *Lita solanella* makes its

yearly depredations of greater and lesser severity. On occasions it has completely destroyed growing crops. Occasionally thrips attack the tops of the potato. These sucking insects are very small and can with difficulty be picked up by the naked eye. They attack the lower sides of the leaflets and form patches which can be distinguished by their silver-grey appearance. The leaves droop, go brown, and die, and as the bottom leaves are the first to be attacked the plant in the latter stages has a palm-like appearance. On occasions crops are entirely destroyed by this pest. Thrips can be destroyed by applications of Black Leaf 40 at two teaspoonfuls to one gallon of water.

The worst enemy of potatoes at Pukekohe is the fungus *Phytophora infestans*, or late blight. Whenever the weather is wet and mild the crop must be protected by Burgundy sprayings. One coating is sufficient to protect a leaf or stem during the life of the plant, but since fresh leaves are continuously forming on the growing plant frequent sprayings are essential during wet weather to give each newborn leaf an early protective coating of the poison. An undefined disease, suspected to be early blight (*Alternarea solani*), is sometimes seen in the early potato crop. It appears in patches. Spraying with Burgundy mixture affords no control, although it is reported to be effective against early blight in other parts of the world. The disease is prevalent only in fields or parts of fields lacking somewhat in fertility or where the natural drainage is not of the best. Except where good drainage is lacking it seems to be prevented by applications of potash and in some cases by potash and lime. The various wilt diseases are fairly common at Pukekohe, and corticium is especially prevalent. Because potato-growing is so intensive, dipping the seed to destroy corticium would not be effective. Dry rot (*Fusarium wilt*) appears sometimes in the seed selected from the autumn crop, but not to a serious extent. Eelworm, common scab (*Actinomyces scabies*), or powdery scab (*Spongospora subterranea*) are seldom encountered. Attacks of silerotium sometimes occur. At times one-quarter of the crop is affected, and the yield is appreciably lowered.

Of the bacterial diseases mattery eye (*Bacterium solanacearum*) is most dreaded on account of its disastrous and obvious destruction, for it is capable of destroying entire crops of potatoes. It appears only in the summer. An epidemic of mattery eye occurred at Pukekohe about twelve years ago, and ever since it has been feared there. It has reappeared now and again in patches in odd fields in one locality. It recurred in one field which had suffered twelve years ago. After the first attack the field was sown in permanent pasture. Last year it was ploughed and cropped, and the following summer crop of potatoes was completely destroyed by this disease. Plants attacked by mattery eye wilt, and the bacteria will finally destroy the potato tubers, reducing the inside of the tuber to the consistency of clotted cream, which, spewing through the eyes of the tuber, gives the name "gummy-eye" to the disease. It is thought that the disease is carried from plant to plant by biting insects. The disease appears in patches and is particularly harmful in wet areas of attacked fields.

Virus Diseases.

The more insidious virus diseases are not so prevalent at Pukekohe as one would expect when one considers the mildness of the climate and the prevalence of insects. The practices that I believe have kept down the incidence of these diseases at Pukekohe are those resulting from the employment of the double-cropping system, which entails early digging of all crops for seed-production. Also the fact that one crop is grown in the winter and early spring when insects are scarce is virtually equal to growing every alternate crop in a cold climate. Before the certification of potatoes scheme was commenced in New Zealand the potato crops at Pukekohe compared favourably with crops in other parts of the country as far as virus-infection is concerned. One or two crops examined at the time showed no evidence of virus-infection. It is, however, surprising that in a district where potatoes are grown so intensively (frequently six crops of potatoes are grown in the same ground in three years) that disease is not more prevalent. The freedom from disease speaks well for the methods of management adopted there. It is significant that on Jersey Island, in the English Channel, the potatoes also maintain their vigour without any or with very little change of seed. The growers there save seed from the early dug early crops. They also grow the early crop in the late winter and early spring and it matures in April, corresponding to our October.

It is comparatively easy to cultivate well and to fertilize intelligently, but the success of potato-growing hinges chiefly on the production of seed of vigour for the planting of each crop.

(To be continued.)

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The Importance of White Clover.

IN soils well supplied with humus the importance of a clover is often not apparent, as the grasses of the pasture are able to obtain supplies of nitrogen from the decomposing vegetable matter. It is on the poorer soils, pumice, clays, and sandy soils, poor often enough because they lack humus, that the value of a clover in supplying nitrogen to the other plants of the pasture and also in preventing loss of moisture through evaporation from bare ground is often well demonstrated. The photographs illustrate the point. Both were taken on the same field sown after a good preparation with the same grass-seed mixture. On this particular soil-type phosphate and lime are essential to white-clover growth.

In Fig. 1 the effect of top-dressing is shown in the white-clover establishment, and the effect of a good white-clover cover on the strength of the rye-grass. Note the broad, strong grass-leaves, which are also dark green. Fig. 2 was taken on a strip where the top-dresser had missed when the area was sown down, but which had subsequently been top-dressed.

The initial failure of the white clover is reflected in two outstanding features: First, the yellow stunted rye-grass, and, second, the drying-out and cracking of the soil. No amount of phosphate, lime, or potash will give a good growth and cover of rye-grass and cocksfoot on soils lacking in humus unless there is a suitable clover to respond to the action of the fertilizers and to supply the necessary nitrogen required in addition by the grasses to make leafy growth.

White clover is outstanding on the heavier soils, and subterranean clover on the lighter and drier soils, in making up this deficiency in humus and nitrogen.

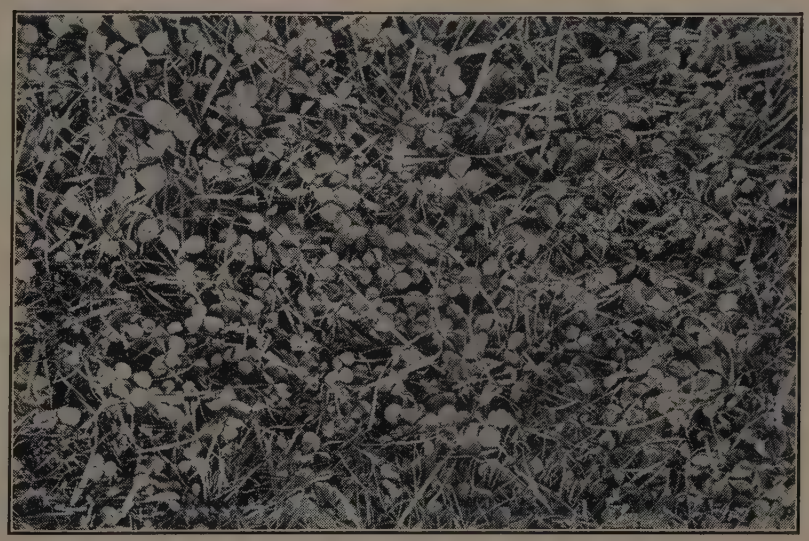

FIG. 1.—The benefit of white clover on land lacking in humus.

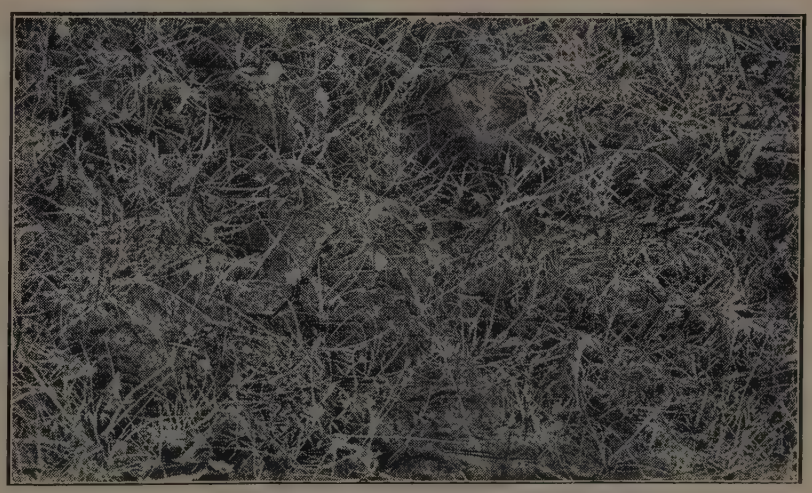

FIG. 2.—Clay land lacking in humus.

Head Smut in Maize.

SAMPLES of maize cobs sent by the Instructor in Agriculture, Gisborne, to the Mycologist, Plant Research Bureau, Palmerston North, have been found to be infected with one of the maize smuts. Present indications are that it is head smut, the less serious of the two smuts which commonly attack maize. This smut attacks the tassel and the bob. Infected cobs swell at the base, the swelling eventually becoming a large ball of black-smut spores.

The other smut, known as common smut, attacks all parts of the plant, and is first seen as little whitish swellings on the leaves and stem. These swellings later rupture, throwing out masses of black smut which cover the plants, making them very conspicuous. Inquiries in the district show that the form of smut reported on has been in the district some years and that it is fairly widespread, though many crops are free.

A thorough survey of the position is being made, and it is possible that by taking definite steps at this stage the smut can be eradicated.

Tassel of maize affected with head smut.

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Liming of Pastures.

MOST of our soils require phosphates and some of them require lime in addition. The necessity for lime can be ascertained only by field trials or by comparing the soil with other soils of similar nature on which trials have been carried out. Generally speaking, soils which do not give a response to super alone, but give better results to slag alone, are lime responsive. Further types of soils responding to lime were described in the January issue. Responses to lime show up in improved white-clover growth, which in turn is reflected in improved grass growth. The responses are usually most marked in dry weather or other periods of normal poor pasture growth. A farmer can easily ascertain the need for liming his pastures from a simple field trial. Peg out several plots 1 chain square, and apply lime at the rate of one ton per acre. For at least two years make regular observations of these squares, and note any change in the clover or grass content. If a marked increase in clover occurs, then liming is essential; if only small differences occur, and then only in dry weather, lime is not so necessary, and only small amounts with super will be beneficial.

FIG. 1.—Superphosphate plot on a heavy loam soil overlying limestone; two autumn dressings of 3 cwt. of super. Note the small amount of clover, non-thriving grasses, and the large amount of plantain.

No advantage is to be gained by using burnt lime on grassland in the place of ground limestone or carbonate of lime. Quick returns from lime are associated with frequent applications of finely ground limestone rather than infrequent dressings of relatively coarse material. High-quality limestones are generally very hard, and require to be finely ground; while lower-grade limestones are softer, and require very little crushing. The fineness of grinding and hardness of the original stone both affect the quickness and duration of the response from lime. Where the landed cost on the farm is high, a finely ground high-quality limestone will be found to prove more economical. On the other hand, a lower-grade limestone subjected to low cartage costs will often give a quicker although not so lasting a response as a higher-quality limestone.

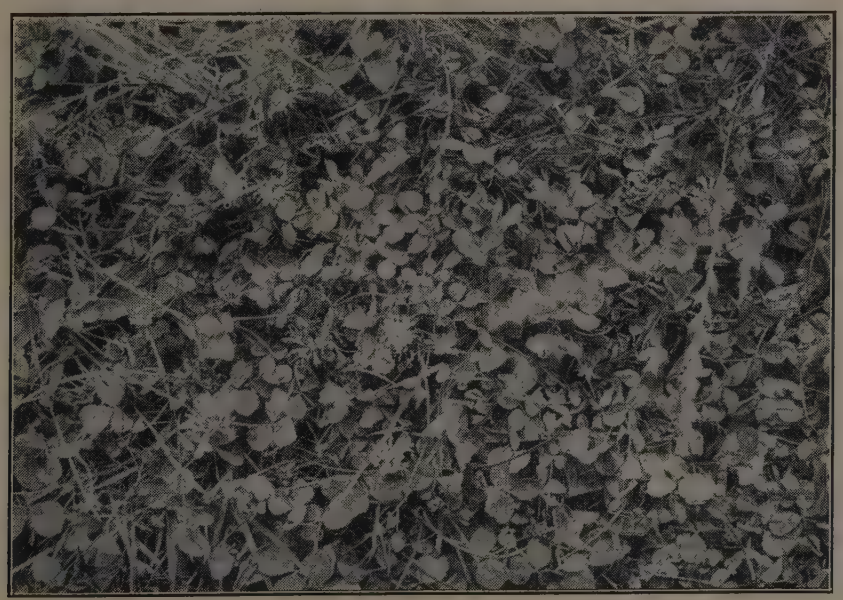

FIG. 1A.—Superphosphate-plus-lime plot on same soil as Fig. 1; same dressings of super with 1 ton of lime at time of laying down, and one autumn dressing of 5 cwt.; the response is excellent, clovers much increased and plantain absent; also more vigorous growth of grass and clover.

Normally, lime readily makes its way downwards in the soil, and especially in districts of high rainfall tends to be washed away and lost to pasture plants. The present practice in liming tends towards relatively small dressings, say, 3 cwt. to 5 cwt. per acre, repeated every season, rather than heavy dressings at long intervals. Where the soil is decidedly deficient in lime, an initial dressing of 10 cwt. to 1 ton per acre, followed by smaller annual dressings, proves very beneficial. Where lime has not been applied previously to a pasture, the first application is best made during February or early March, before the autumn top-dressing. Otherwise, success attends the application of lime in April or May. Whether better results are obtainable from applying lime at any other season is still a question of further experience, as no conclusive evidence is available at present. At the times

stated there is usually no marked pressure of other work. Generally, the best returns are to be obtained from the use of superphosphate with lime; lime alone seldom gives good results. To-day the question of liming forms two features of pasture top-dressing—(1) There is a failure to use lime in adequate amounts on land which would respond economically to its application, and (2) there is a use of lime either partly or wholly in replacing phosphates on soils where its use is not financially sound. Farmers are advised to get into touch with local officers of the Fields Division for further details regarding the lime requirements of their land.

—E. H. Arnold, Dargaville.

Californian Thistle.

A SOUTH Taranaki farmer has successfully used agricultural salt in controlling Californian thistle in some of his pastures. The patches were cut in January and treated with 3 cwt. to 4 cwt. of agricultural salt per acre. Growth of thistle came away normally, but the salted patches attracted the cattle some weeks later, and the patches were grazed bare. Ordinary mixed stocking served to keep the thistle patches well grazed in the autumn and winter. The following summer the thistle-plants were decidedly weaker and had changed to a more leafy and less prickly form readily eaten off by the stock.

—J. E. Davies, Hawera.

Top-dressing in Southland.

MARCH is a most important month in the South, as during this period the foundation for the following seasons grazing are generally laid. Unfortunately, pastures are frequently allowed to show some definite sign of deterioration before any attempt is made to top-dress, and at this stage one is confronted by the question, "Will it pay me to top-dress this back to a high-production pasture?"

Generally to top-dress a pasture from a low-production to a high-production stage is a long and involved process calling for rather better than ordinary attention to pasture-management; at no time must the herbage be allowed to get out of control, either by over or under stocking, and at times it will be found necessary to use the mower. "Run-out" pastures are often best "improved" by ploughing up and resowing, after a rotation, and, following the sowing of an expensive grass-seed mixture, annual applications of fertilizer are essential to save the pasture "running out."

Top-dressing *must* be undertaken in the first year, and must be followed by reasonable-grazing management and further annual applications of top-dressing if maximum results are expected from the paddock. Consistency is often, perhaps generally, a considerable factor in responses to top-dressing. This is often strikingly illustrated on farms on exactly the same soil type, separated by either a road or a fence, one systematically top-dresses every season and the returns per acre are high, the other where liming and top-dressing are cut down to a minimum, sometimes not undertaken at all, in the interests of economy (?) until too late, and the returns are in consequence low.

—W. Faithful, Gore.

Fig. 2.—Superphosphate plot on a heavy clay loam (podsolized); two autumn dressings of 3 cwt. of super. Rye-grass not thriving, little and non-vigorous clover, open sward with bare ground.

Fig. 2A.—Superphosphate-plus-lime, plot on same soil as Fig. 2; same dressings of super with 1 ton of lime at time of laying down, and one autumn dressing of 5 cwt. Note increase in clover and the denser covering, with absence of bare ground.

Dairying without Root Crops, Hay, or Silage.

In recent years shortage of farm labour has been partly or wholly responsible for variation from routine practice on what were formerly entirely dairying-areas. The introduction of up to one hundred breeding-ewes per 100 acres and the practice of fattening store lambs, both replacing a number of cows on what are truly dairy-farms, represents one change. The result in net returns in North and Central Taranaki has not been sufficiently investigated to enable a real survey of the economic situation to be made, but observations to date indicate that from the point of view of pasture management and utilization the introduction of sheep has been generally followed by an improvement in the sward. Under good management it should naturally follow that the total meat and milk production from grass and grass products should be increased.

The method adopted by a Central Taranaki farmer on 162 acres of fairly heavy land is of interest. No hay or ensilage has been saved for twenty years, and no root crops grown for the past six years. Until this season sixty milking-cows were handled without employing labour and one hundred ewes were carried. The highest annual butterfat production was 18,000 lb. This is admittedly lower than that of some neighbouring farms, but no harvest costs or labour difficulties were involved. The area is subdivided into fields averaging approximately 11 acres grazed on about a five-day rotation according to the season. To cope with surplus growth and weeds on top-dressed fields the mower is used and the material left for stock to pick up. Top-dressing is at the rate of 3½ cwt. to 4 cwt. per acre every second year, and for early spring feed four fields or approximately 50 acres are closed in the early autumn and grazed completely off in turn by the cows as they calve. Family labour is now available, and the ewes, which were grazed almost entirely on their own area, except for an occasional clean up of the cow fields, have been sold, and this year seventy-two cows are being milked. This number is to be increased to eighty next season. While the results secured from this method are not claimed to be productive of the highest gross return, it is interesting to note that it has been possible to carry on without employing labour and to keep stock and pastures in very satisfactory condition. The stock do winter well on the somewhat rank pastures kept for this purpose.

At the time of inspection the farm was carrying seventy-two milking-cows, two bulls, three horses, sixteen yearling heifers, and nineteen calves, and, as on all neighbouring farms this season, feed was going to waste. Undoubtedly as an interim measure, until the family labour became available, the practice has certainly paid the farmer who employed it, without causing abnormal stock troubles or marked deterioration in the sward. The practice of changing areas kept for winter roughage and areas specially saved for early spring has been an important factor in keeping the pastures in a satisfactory condition in respect to the proportion of grass to clovers. Sheep-grazing has also played an important part in preventing deterioration of the sward, as well as topping.

—A. G. Elliott, New Plymouth.

News!

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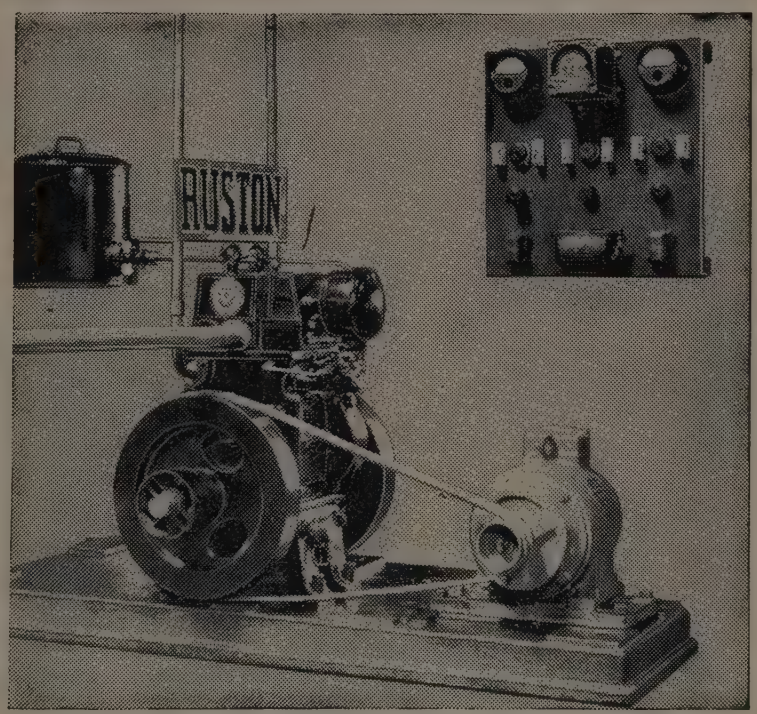

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Establishment of Paspalum.

THE high value of paspalum as a drought resister capable of producing high yields of succulent and palatable feed at a time when other grasses fail has been amply demonstrated during the dry weather experienced in some districts in the past summer.

While a warm climate must combine with a rich and fertile soil to provide the conditions necessary for vigorous growth of paspalum, the plant will succeed on a wide variety of soil types. It will grow on wet swamp, on light land, or on peat; even on soils such as these it will persist indefinitely, and if properly managed will compare favourably with other grasses in point of production.

Normally paspalum makes very slow establishment, and if sown as a constituent of a pasture mixture several years may elapse before it forms any appreciable proportion of the sward. Where rapid establishment is desired, a different method should be adopted. While germination is rapid if the soil is warm, it is very slow and uncertain when the soil is cold, and for this reason sowing is best deferred until November or December. To secure the best results the land should be clean and free from weeds, and this implies a thorough and early preparation of the seed-bed; at this period of the year evaporation is high, and unless the soil is properly consolidated, establishment—particularly on light land—is likely to be poor. The seed should be sown at the rate of about 8 lb. to 10 lb. per acre, with a dressing of about 1 cwt. of superphosphate.

In practice, paspalum alone is unsatisfactory as a pasture, since its production is seasonal and the soil fertility tends to fall in the absence of a legume. In combination with rye-grass and white clover, or, if the soil fertility is low, with subterranean clover, paspalum will quickly prove its value, and a sowing of these should be made in the early autumn. If conditions have been favourable the paspalum will have made vigorous growth and will be thickly and strongly established by the middle of February, when the balance of the seed should be sown. If very vigorous, the paspalum may be grazed by stock and the seed lightly harrowed in, or the disks may be used to chop the rank growth and provide the tilth necessary to cover the seed. A dressing of 2 cwt. per acre of superphosphate should be applied with the seed.

Sown in this manner, the rye-grass and clover develop rapidly, and an excellent partnership is quickly established. With the arrival of the cold weather the paspalum gradually gives way to the rye-grass and clover. These in turn have their season, and when they also wane the paspalum is once more in active growth and ready to take up the running

—P. S. Syme, Ruakura Farm of Instruction.

Photographs showing the effect of deferred sowing of paspalum at the Ruakura Farm Training College. The rate of seeding was the same in each.

FIG. 1.—A pure sowing of paspalum at the rate of 15 lb. per acre in November.

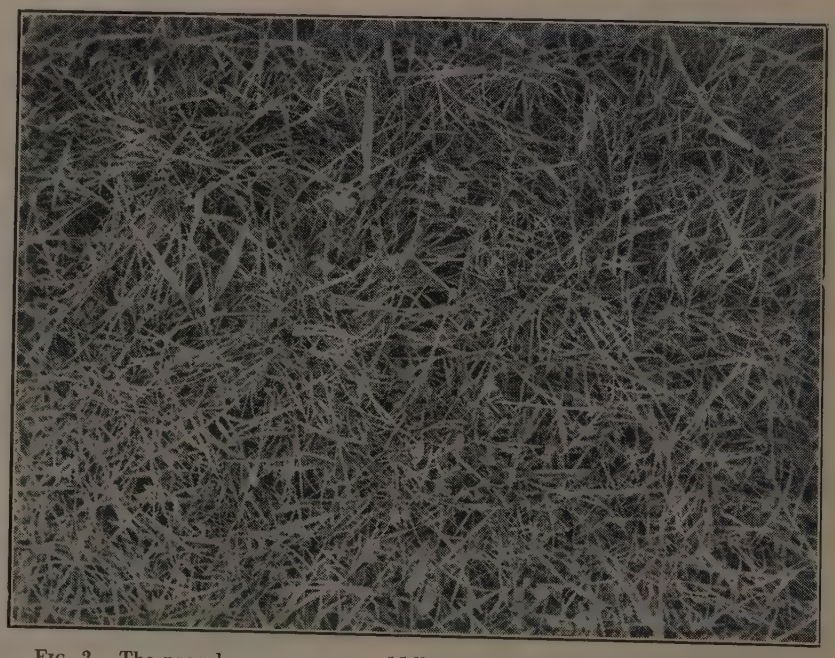

FIG. 2.—The paspalum was sown at 15 lb. per acre in a seeds mixture sown in September. Note only two plants of paspalum showing.

Autumn Top-dressing in Bay of Plenty.

MOST of the top-dressed grassland in the Bay of Plenty receives a fertilizer dressing during the autumn, so that the present is an opportune time to discuss points relative to this practice.

Generally speaking, top-dressing should take place in February or early March, so that a combination of warmth, autumn rains, and increased fertility will lead to good growth of pastures before colder conditions set in. Very often top-dressing is delayed until May and June, with the result that growth is not materially improved before spring conditions arrive.

In the choice of fertilizer there should be no hesitation in selecting one of the phosphates. In experiments conducted throughout the Bay there is evidence that phosphatic dressings are by far the most satisfactory. In fact, in many localities they are the only dressings to give payable results. Of this group, superphosphate appears to be the best on most dairying-lands, especially on the lighter pumice soils. Basic slag has also given good growth where the land has been somewhat heavier. Dressings that can be recommended are from 3 cwt. to 4 cwt. per acre applied in February or early March.

Although a good deal of lime has been applied, its general usefulness is doubtful. There is certainly some evidence of lime response on silts and a few of the older pumice areas in the Te Puke and Tauranga districts. Until the phosphate requirement is well provided for, however, lime cannot be recommended unless it can be applied as an additional dressing to the phosphate. Where lime is used, an initial dressing of 1 ton per acre will be required to effect an improvement.

Potash, like lime, is of doubtful value on some soils. There is evidence, however, that it has a place on the hill-country soils behind Tauranga and also in the Katikati district. Recent trials have produced interesting results on this country, suggesting that some potash is essential to pasture development. Before any expenditure is made on potash, however, further information should be sought from the local Instructor in Agriculture at Tauranga.

—*C. Walker, Tauranga.*

Potato crops in Canterbury promise a very heavy per-acre yield. The weather experienced since early in December has been exceptionally favourable for growth. In some cases farmers considered the top growth to be too rank for maximum yields, but investigations prove that there is every prospect of high production. Some late blight is in evidence in some districts, but so far the attack is fairly slight.

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Autumn-sown Green-feed Crops.

THE sowing of green-feed crops is a matter which calls for some consideration as the crop chosen is to provide stock-feed during the winter and spring period. Greed-feed crops should be quickly maturing, and consequently the selection of varieties should be dependent upon the time at which the feed is to be required. There are several kinds which are suitable for the production of the necessary feed, such as—

(1) Italian rye-grass.
(2) Western Wolths.
(3) Algerian oats.
(4) Cape barley.
(5) Black barley.
(6) Ryecorn.

Of the above varieties the most early maturing are the Italian rye-grass, Western Wolths, and the cape and black barley, the Algerian oats and ryecorn being a little later.

Italian Rye-grass.—This grass is of short duration and will persist usually no longer than two years. It will grow on almost any soil, but thrives on highly fertile country. It loves warmth and moisture, and on rich, damp soils it makes extremely rapid growth. A suitable seeding is from 25 lb. to 30 lb., and it is widely used with red clover to form a temporary pasture of from one to two years. When used in this way the inclusion of 5 lb. of red clover is necessary.

Western Wolths.—This grass is very similar to the Italian rye and, like Italian, it will grow on almost all soils, the best results being obtained on heavy loams, clays, and peaty soils. Its period of growth is, however, very much shorter than that of Italian rye-grass. The seeding to be sown is 25 lb., and the inclusion of 5 lb. of red clover is helpful.

Algerian Oats.— Algerian oats are preferable as they are resistant to rust. When autumn-sown they may be utilized for green feed in the spring and then left for seed or for chaff. A 2-bushel seeding per acre is satisfactory.

Cape Barley. — This is a quickly maturing variety and may be utilized approximately six weeks after sowing. One to 1½ bushels per acre is a suitable seeding, though sometimes, however, it is mixed with tares, and when this is done ¾ bushel of barley and ¾ bushel tares is sufficient.

Black Barley.—This barley appears to be able to withstand the frosty conditions much better than Cape barley. A seeding similar to that of Cape barley is suitable.

Ryecorn (secale cereale). — This is suitable in that it may be grown on poor sandy soil and also as it is very hardy. It may be sown in the autumn, but it will give satisfactory results when sown as late as April. Sometimes seasonal work is delayed with a resultant delay in the sowing of autumn green-feed crops, and under such circumstances ryecorn is very useful to fall back on. A seeding of 2 bushels per acre is required.

While the practice of sowing super with autumn green-feed crops is not carried out as extensively as it might be, it would be to the advantage of the farmer to sow 1 cwt. with the crop. This would bring about a better braid and promise a much quicker growth.

—*T. A. Sellwood, Oamaru.*

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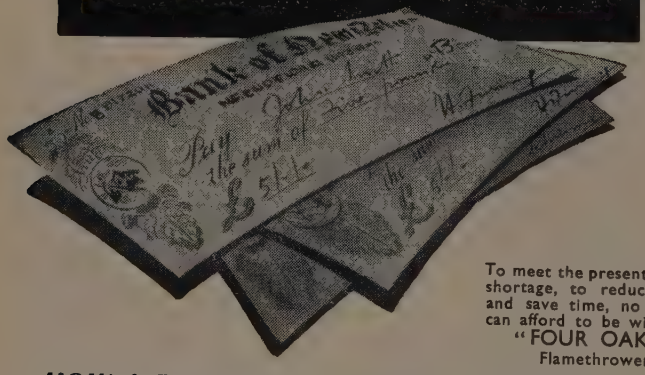

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A.J. 1.

Growing Winter Grass.

MAINLY because of a shortage of nitrogen, most pastures produce little during the winter. Either by buying artificial nitrogen or by making the best use of that natural nitrogen which is available, we can partially make up this shortage. The weather and the farmer's management both before and after the artificial nitrogen has been applied will together decide whether the purchased nitrogen will pay.

To obtain profit from the use of artificial nitrogenous fertilizers, and particularly from sulphate of ammonia, prior and adequate phosphating and liming of the pasture—at least 3 cwt. of each to the acre each year—are essential. For winter grass, artificial nitrogenous fertilizers should be applied in April or early in May, and, particularly, only when the grass is still growing and when it has some little growth—say, 2 in. Keeping stock off the treated pasture until the growth has reached about 8 in. is equally as important. The top of the spelled pasture should then be grazed off, leaving about 3 in. ungrazed. Do not graze bare. Then spell the pasture again until the next 8 in. stage.

Pasture consists mainly of fog, rye-grass, cocksfoot, and white clover. Shut up on 19th April, 1937; photo taken on 13th July after eighty-five days' spelling. Commencing on 19th July, forty-six P.A. cows and forty-six P.A. calves grazed this winter-spelled pasture of 7⅛ acres for eight full days. There was then from 3 in. to 4 in. of herbage ungrazed. [*H. Drake, photo.*

Should the farmer wish to grow winter grass without purchasing artificial nitrogen, he may make the best use of the natural nitrogen which is available by refreshing the clovers with a March or April top-dressing of super, and by strengthening the grasses by long spells from grazing after the manner just described. Whichever method is chosen, hay and other supplements must be fed out before they are actually required.

Feeding out normally begins when the pastures have been grazed bare; but, to grow winter grass, feeding out must begin some weeks before it actually becomes necessary. Only in this way can fields be closed up while the grass is still growing; and only by closing fields while the grass is still growing can we secure winter grass.

—*E. R. Marryatt, Ruakura Farm of Instruction.*

The Storage of Onions.

BEFORE storing onions for keeping for sale in the winter, examine them carefully to see that they are thoroughly dry, paying particular attention to the neck of the onion. At the same time discard all onions with thick necks, for these will not keep, and should therefore be sold off the field.

If only one or two bags of onions have been harvested, the tops need not be clipped, and the onions can be strung up in a shed. Where large quantities of onions have to be dealt with, they can be stored in sheds, either loose in heaps or in bags, crates, or boxes, or on racks, or they may be pitted in the open. It is difficult to state what method of storage is best. Providing they are properly dry at harvesting-time and placed in a cool, dry place, onions will keep well whatever the method of storage. For pitting in the open, a number of boxes should be placed on the ground, the bags stacked upright on top of these two deep with air-tunnels for ventilation, and the whole covered with straw or other material to shed the rain. The straw should be weighted down to keep it in place. Onions keep quite well pitted in this way.

If the roof of a shed holding onions is made of iron, the interior of the shed, particularly near the roof, will be very hot during the day and cold at night. Much moisture also will condense on the roof in the evenings. These conditions are unsuitable for the keeping of onions, but the trouble may be minimized by placing insulating-material under the roofing-iron. Sheds for storing onions really should have wooden or other material than iron for roof-construction.

Onions stored in bags, crates, or in racks can be examined easily for evidence of root growth or sprouting, but onions stored loose are more difficult to examine. However, usually it is not necessary to examine them, as the onions at the top of the heap generally commence growth before those beneath.

—*J. E. Bell, Auckland.*

Fertilizers: (2) African Rock Phosphates.

WE have seen in the January issue of the *Journal* how important to New Zealand are the rich phosphatic deposits of Nauru and Ocean Islands. Though these deposits are easily the richest in the world, yet they are not the largest. Extensive deposits occur in America, North Africa, and Russia, and though some supplies have been imported from America in the past our only other source of supply now is North Africa. Large deposits occur there in the French colonies of Tunisia, Morocco, and Algeria, and in British Egypt. Moroccan and Algerian phosphate is seldom imported, and nearly all comes from Tunis, with some from Egypt. Imports from both these sources average about 7,000 tons per annum over the last six years, and by far the greater bulk of this comes from Tunisia. This average annual import seems insignificant by comparison with the amount of Pacific phosphate imported, but it must be remembered that very nearly all of the latter is used in the manufacture of superphosphate, whereas the former is for direct application to the land.

Tunisian and Egyptian Phosphates.

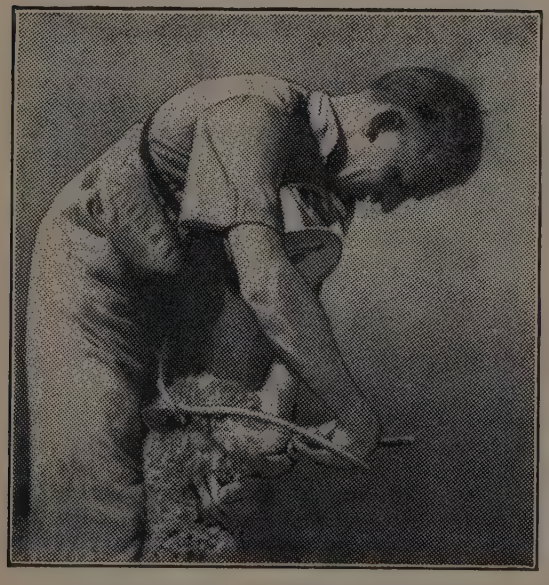
These two types of phosphates are very similar in general characteristics. They are both considerably softer than Pacific phosphates and are therefore easily ground to a very fine state of subdivision.

The chief deposit in Tunisia is at Gafsa, where is situated the largest mine in the world. Phosphate from this source is generally sold as Gafsa phosphate or under various names such as Phosfull Non-acid Phosphate, Richfos, &c. The percentage of water insoluble phosphoric acid is between 26 per cent. and 32 per cent. or, in terms of Tricalcic Phosphate, 58–70 per cent. In New Zealand the general specification is 58–63 per cent. Actually this is incorrect, and if standard practice were followed would be 26–29 per cent. phosphoric acid insoluble in water. In addition to its phosphate, Tunisian rock also contains about one-tenth of its weight as lime, hence the term "Phosfull *non-acid* Phosphate." The amount present, however, is negligible if the land requires lime.

Egyptian phosphates are worked at different sources by British and by Italian capital. They are very similar to Tunisian phosphates, the well-known Ephos brand on the New Zealand market containing about 26 per cent. phosphoric acid insoluble in water. Of recent years the amount imported into New Zealand has been small, about 1,500 tons per annum.

It should be noted that the phosphate of all rock phosphates is present in a comparatively insoluble form. A weak solution of citric acid is supposed to have a similar solvent action for soil solution, but even in this rock phosphates are only about 25 per cent. to 40 per cent. soluble.

Next month's note will deal with phosphatic guanos and the uses of rock phosphates and guanos.



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Cultivation, and the Potato Crop.

THE general principles underlying cultivation practice are much the same for the majority of farm crops. However, most crops have some peculiarities or limitations which necessitate the adoption of particular practices in order to maximize the yield and obtain high quality of produce.

Potatoes are no exception to this observation. Cultivation operations prior to and following planting should aim particularly at a deep, loose tilth, destruction of weeds, moisture-conservation, and prevention of tuber contamination due to disease.

A deep, loose tilth can best be obtained prior to planting by deep ploughing and frequent deep grubbings, and after planting by adequate use of the scuffler or moulding plough. This deep cultivation not only facilitates subsequent operations designed to kill weeds, conserve moisture, &c., but also allows for unrestricted growth of the set, which room for movement gives a high yield of good-shaped tubers and good aeration, which is essential for tuber development.

Destruction of weeds commences during the cultivation preceding planting, when periods of inactivity to promote germination of weed-seeds are followed by thorough cultivation to destroy weed-seedlings and promote the growth of weed-seeds remaining near the surface. This effect must be maintained after planting and before the appearance of potatoes, the haulms of which would interfere with complete weed-eradication. As soon as weeds appear, and probably within a week or so of planting, the ridges should be broken down with the harrows to root out weed-seedlings, and moulded up again to bury the weeds that have not been killed. This procedure should be repeated at intervals, depending on the length of time the haulms have taken to appear. In some districts where weeds are severe it is a common practice to harrow even when shaws are 6 in. to 9 in. high.

Adequate intercultivation at intervals during the growth of the crop, up to the time when the growth of haulms prevents further cultivation without injury to plants, should be resorted to, in preventing further weed-growth between rows. Hand pulling of weeds growing on top of ridges, and consequently inaccessible during scuffling, should occur if advisable.

These intercultivations also maintain a deep, loose, well-aerated tilth. However, as tubers are set, the width of the cultivator should be reduced to prevent injury to sets, and moulding-wings should be always present on the main beam at the rear of the scuffler, to mould up the loose earth, thus preventing baring and greening of superficial sets. Moisture-conservation is also promoted by these means, a factor of importance to Canterbury farmers, if not to Otago and Southland growers.

A high tent-like ridge should be maintained, to prevent the spores of late blight from penetrating the soil and contaminating the tubers. It is an accepted fact that late blight is rarely transmitted from the leaves to the tubers by means of the stem of a potato-plant. When a wide ridge with a hollow depression on top exists, spores are washed off the leaves, accumulate in the hollows, and filter through the soil to the tubers. Where a narrow high ridge is present, these spores, which are in reality the seed of late blight, do not penetrate, but are shed into the hollows between the ridges, preventing injury, and so maintaining high tuber quality.

The sum-total of these operations is a higher yield of better quality tubers, and the personal satisfaction of knowing that a good job has been well done.

—A. F. Greenall, Balclutha.

Sowing of Onion-seed for Transplanting.

IN the milder parts of New Zealand onion-seed is sown in the autumn in beds for the production of plants for planting out in the field in the late winter or early spring. The onion crop so produced yields heavier and matures earlier than spring-sown onions, and the work of transplanting is compensated by the less trouble in weed control and the surety of a good stand of plants. The onion-seed is sown in late March and April about ¾ in. deep in rows 1 ft. apart on a fine and firm seed-bed at the rate of 1 oz. to the chain. The seed may be sown with a Planet Junior machine, each 5 lb. sown in this manner providing sufficient transplants for one acre of ground.

Although the precaution is more important for the spring-sown crop, care should be taken to test the germination of the seed. Onion-seed loses its vitality very rapidly, lasting as a rule for only one season. Care should also be taken to select seed of high yielding-power, which will produce onions that resist mildew attack. The Pukekohe Straw Spanish variety, famed for its high yield and early maturity, and the Pukekohe Longkeeper, famed for its keeping-qualities, are the two onions which are recommended for sowing. The Brown Spanish variety is usually unsuitable, because it succumbs quickly to attacks of mildew and does not develop a crop.

The seed-bed should be well limed and given a dressing of fertilizer suitable to the soil before sowing. Usually super and bonedust at 10 cwt. per acre gives good results. Fertilizer mixtures such as super and sulphate of ammonia, which tend to force the growth of the plants, should only be used when sowing is late or where conditions for growth in the winter are poor.

—J. E. Bell, Auckland.

In considering the question of soil fertility it is well to bear in mind that productiveness is by no means entirely determined by the percentages of plant-food present. The soil for profitable growth must contain plant-food in readily assimilated forms, but the soil must be in such a mechanical condition as to provide a suitable seed-bed for germination of the seed sown, and permit of a ready extension of the root system as growth advances. The first aim of the farmer should be to improve the tilth of his cultivated land, and the chief means towards that end is thorough soil preparation for all crops.

Nurse-crops in Southland.

In the coastal districts of Southland, which coincide with heavier rainfall, in the vicinity of 45 in. per annum, successful grass establishment with a nurse-crop can be invariably expected, but the present season has been an exception. Conditions during the first half of 1937 were exceptionally wet, whereas the second half of the year was the reverse.

The harvest has been early, and, as warm weather has followed, the effect of this on the weak rye-grass has resulted in a high death-rate. Generally speaking, the bulk of the grass-seed is sown with oats in October, which may be harvested in January and early February. As a general rule the pastures will not be grazed until towards the end of February, and will provide clean grazing for weaned lambs intended for breeding purposes.

In the majority of cases in a normal season more successful clover establishment follows this practice, as the clover has a longer period to establish itself before the first grazing than would be the case if the grass was sown alone.

Rape is also used as a nurse-crop. Many farmers follow the practice of sowing the rape through every second or third coulter of the grain drill, so as to permit the grass better establishment. This crop is generally sown in November, and would be ready in February. In general it can be said that following a successful rape crop the resulting pasture is poor, but, on the other hand, more often it is the case that the rape crop is poor due to club-root and the pasture correspondingly good.

—A. Stuart, Invercargill.

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Grass-seed Beds on Light Soil.

To get a satisfactory strike of clovers, especially of white clover, it is essential that the seed-bed be firm. Good consolidation can be obtained by working the seed-bed over an extended period, but generally the use of the roller is relied on to get the necessary firmness at the surface.

On many small farms where only a few acres are sown down to new grass each year a roller of the weight required to consolidate the seed-bed on light volcanic or sandy soils is often not available. This difficulty has been overcome on a farm recently visited in South Taranaki, with very satisfactory results. After thorough preparation of the seed-bed, the final stroke of the chain-harrows prior to sowing is delayed until the land is wet. By harrowing the land while wet on the surface and immediately sowing the seed excellent strikes of white clover have been obtained, with no apparent detriment to the strike and early growth of rye-grass, cocksfoot, and other grasses.

The same marked improvement in the strike and early growth of white clover has been noted elsewhere on sandy soils where the final harrowing has been done while the land is wet after a good shower. The light harrowing of the wet soil gives the necessary surface consolidation and prevents too deep burying of the fine seed.

—C. J. Hamlyn, Palmerston North.

Brown-top-seed Certification.

APPLICATION for the inspection and certification of brown-top pasture for the production of genuine brown-top seed (*Agrostis tenuis*) may now be lodged at any office of the Fields Division, Department of Agriculture.

Fresh applications are required each year in respect of area already inspected, accepted, and registered.

Field Charges.—An entrance fee of 10s. (which covers inspection services, when necessary) must accompany the application, and is the only charge made for field services irrespective of the number of acres to be inspected or harvested.

Refunds.—A refund of the entrance fee will be made only when the application for certification is ineligible.

Late Entries.—Applications not received on or before the closing-date, 15th June, 1938, will be regarded as late entries and must be accompanied by an additional fee of 10s. Late entries will be accepted and regarded as eligible only provided the Department agrees to perform the services required.

General.—Separate applications must be submitted in respect of each form. In the case of new areas early application is essential, and the Department reserves the right to refuse to accept applications in respect of such areas when it considers the growth of the plants too far advanced to allow of accurate inspection.

—*J. M. Smith, Fields Superintendent, Dunedin.*

Pasture-sward Improvement.

IN addition to top-dressing, dairy-farmers adopt three distinct methods of pasture-sward improvement: to plough and resow; to surface cultivate and sow seed and fertilizer; and to feed out crops to stock. With ploughing, the land may be resown to grass after an annual crop or directly following grass; on light land the direct sowing of grass following the breaking-up of a weak pasture gives good results, the land is then in a reasonable state of fertility, and the grass may be sown early in the autumn with every chance of successful establishment.

With the advent of reliable perennial strains of grass and clover-seed, ploughing and resowing offers the most successful method of improving poor pastures. The improvement of poor swards by surface cultivation and the sowing of seed and fertilizer is most satisfactory on open swards, where bare ground is the chief weakness; if the pasture is poor because it is weedy, the results of surface cultivation and oversowing are often unsatisfactory. The method is often quite a good one to establish white clover in a young pasture, where white-clover establishment has been poor initially from late sowing or sowing on an unconsolidated seed-bed.

Improvement from feeding crops to stock is most successful on fields where only patches of the sward are poor, where grass grub has depleted pastures of the field, or where on patches of light soil the pasture sward has been destroyed by hot weather. Patch improvement is best accomplished by feeding out hay to cattle, particularly hay containing some ripe grass and clover seed. The stock consolidate the land, cover the seed, and concentrate their manure when the hay is fed out.

—*C. S. Dalgliesh, Rotorua.*

Wintering of Implements.

FARMERS as a general rule consider the cost of wintering animals and can often give the exact figures. Few, however, consider the cost of wintering farm implements. Quite a number appear to consider it cheaper to allow machinery of all kinds to stand out in the weather than to provide shelter.

It is quite safe to say that on many farms implements are not worn out by actual service. Ploughs lie rusting in the fields, harrows are hidden by growing crops, and wagons, drays, &c., stand out in the open air until the wooden parts are warped and cracked by the sun. Such expensive implements as harvesting machinery, drills, and cultivators very often do not fare any better. Under these circumstances it is not surprising that the expense of running a farm is sometimes found to be excessive and the credit balance at the end of the year small.

Rough timber for an implement-shed is much cheaper than intricate and expensive machinery. One carefully planned implement-shed will last a life-time, and machinery kept in it will be serviceable years after that left outside has been consigned to the scrap-heap.

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The FARM-ACY

17 Morris Street, Palmerston North

African Boxthorn in Taranaki.

ANY one visiting Taranaki must be impressed by the excellent farm shelter and stock-proof hedges on the majority of dairy-farms. A further striking feature is the almost universal use of African boxthorn on the lighter free-draining but fertile soils of coastal districts, particularly in South Taranaki, and the clear-cut change-over to barberry as one proceeds inland towards Mount Egmont. While boxthorn will not thrive where the subsoil is at all stiff or on poor soils, it does stand up well to salt-laden winds. Barberry, on the other hand, will grow well on much stiffer soils than does the boxthorn, but is severely checked and cut back by salt winds.

The development of boxthorn as a hedge plant is best seen from Patea to Hawera inland towards Te Roti, thence across to Pihama and Opunake. Here the plant is seen as neat-trimmed hedges 4 ft. to 5 ft. high and as main shelter-belts up to 15 ft. and 20 ft. African boxthorn

Fig. 1.—Ditch opened, and bank formed ready for plants.

was introduced to New Zealand some fifty years ago, and at Otakeho, in South Taranaki, a 40-chain hedge planted in 1884 is to-day strong and flourishing. Ordinary subdivision hedges are kept trimmed in the usual way, while main shelter-belts of boxthorn are kept within bounds and rejuvenated by cutting back hard when required. This is often done by cutting one side and leaving the other to the following year.

Fig. 2.—Plants laid on bank, and roots covered with soil. Note extension of plants over the open ditch.

Planting Boxthorn.

This is usually done in the spring, seedling plants being used. Ordinary methods of hedge-planting are not altogether successful with boxthorn, and the following practice is generally adopted. It is a modification of the ditch and bank. Two to three furrows are ploughed along the hedge-line, the second and third furrow slices are placed on top of the first, sod down, forming a low bank. On this bank a sprinkling of artificial manure (super and blood-and-bone) is given, and the seedling plants laid horizontally 6 in. to 8 in. apart, with the top end of each plant extending out over the open ditch. A spit of soil is then taken from the ditch and used to cover the roots of the plants. Growth is made from the end of the plant over the ditch, and by keeping the ditch clean the plants are kept free from choking grass-growth. A temporary guard fence on the ditch side is necessary for two to three years, by which time the hedge should be stock proof. The ordinary fence on the bank side can also be removed. Seedling plants are generally raised by local nurserymen and sold to farmers as yearling or two-year plants. Prices range from 14s. to 18s. per thousand, which is sufficient to plant about 10 chains.

—J. E. Davies, Hawera.

Many farm-management investigations show that on nearly every holding a part of the farm operations is carried on at a loss. Unprofitable dairy stock is one of the factors making for lack of profit on some farms, but in most cases where unprofitableness is found the chief factor is low-producing, worked-out soil. In some cases land is used for cropping that is not in a condition to give a reasonable return. Much of this land may be marginal land unsuitable for crops such as wheat, but in times of keen demand wheat is sown, with the result that unless climatic conditions prove exceptionally favourable results are unsatisfactory and generally the average yields per acre are decreased.

Every farmer who owns unprofitable land should make a detailed examination of his farm to determine what crops should be grown. This analysis should determine what areas can be profitably cropped and which should be left in permanent pasture.

Section for Irrigation Areas.

Contributed by Officers of the Fields Division.

Preparation of Land.

Three Recognized Methods.

THE chief concern of the intending irrigator is how to get the water over the land as cheaply and efficiently as possible. There are three recognized methods which may be adopted. Each requires a certain amount of prior preparation, and each has varying degrees of efficiency in distributing the water. In order to assist development of the Canterbury irrigation schemes arrangements can be made to have this land-preparation carried out by the Public Works Department at cost price to the farmer. The procedure being adopted is that those requiring land prepared make application either to the Department of Agriculture or the Public Works Department. These two Departments, acting in co-operation, will advise which method should be adopted, the approximate cost, the necessary prior and after cultivation, and the most suitable crop to sow.

The three methods are as follows:—

(1) The contour or wild-flooding method.

(2) The border ditch (a modified and more exact method of wild flooding).

(3) The border dyke (the most efficient system).

Fig. 1.—Supply ditch at Levels. This ditch is also suitable for wild flooding.

The first two are suitable only for irrigating already established pastures. No. 1 is adaptable either to steep or flat land, but is really most suitable to land having a fairly substantial fall, while No. 2 is suitable only for flat land or land having little fall. By the third method almost any crop may be irrigated. It is adaptable only to comparatively flat land.

Fig. 2.—Head ditch for border-dyke method. Note the depression near the hedge where the soil has been taken to form the bank in order to raise the bottom of the ditch to ground-level.

Place of Head Ditches.

In all the methods head ditches, running on a flat grade across the greatest slope of the land, are necessary. They must be placed along the highest part of the field, in order to command the whole of the area to be irrigated. There are two types of head ditch, viz.:—

(*a*) A supply ditch cut directly out of the ground, down which the water flows for the most part, except in depressions, below ground-level. This type of ditch is suitable for the wild-flooding methods, a canvas dam being used to bring the water above ground-level, while the "cut" from the ditch forms the retaining banks over or through which the water flows over the area to be irrigated.

(*b*) The other type of head ditch is used in the border-dyke method. Here it is necessary to concentrate the water at intervals through openings or "head gates" on to the land. To obtain the maximum use of the water the head ditch must be raised so that part of the water is flowing above or about ground-level while irrigation is in progress. The banks of this type of ditch must therefore be of a fairly substantial nature, and it is necessary in almost every case to obtain extra earth from another source, generally from alongside the higher side of the intended race, to form at least one bank.

Supply ditches capable of holding 8 cusecs of water can be made by using a single-furrow swamp plough and shaping the banks with a Martin ditcher.

Fig. 3.—Border ditch fed from supply ditch. Note the earth-filled manure-sack to regulate the supply of water.

Approximate Costs.

The head ditch for the border-dyke system would, if constructed by the farmer, require a certain amount of hand-work besides the plough and ditcher. Carried out by the Public Works Department, with suitable implements at their command, the approximate cost is as follows:—

Supply ditches for wild flooding, 1s. 6d. to 2s. 6d. per chain.

Supply ditches for border dyke, 2s. 6d. to 7s. 6d. per chain.

(1) In the contour method the water is allowed to spill from the head ditch, from which it flows down the slope of the land, gradually concentrating in hollows and depressions. In order to again make use of the water, furrows running across the fall of the land are necessary. These furrows, called "contour furrows" since they run with the contour of the land, are so made with an ordinary single-furrow plough that there is only a slight fall throughout its length sufficient to keep the water moving. This means that when the water is checked it again spills over and irrigates down the greatest slope. The method reaches its greatest efficiency on hillsides, and has been found to be unsuitable on land having a fall of less than 6 in. per chain, and therefore unsuitable for Canterbury conditions.

(2) The border-ditch method consists of forming small feed ditches connected with the supply ditch and running down the greatest slope of the land. These can be made with either a double or single furrow plough by simply turning the furrows, as in an ordinary finish. These ditches should be situated on the ridges of the field. It has been found that, in the main, on Canterbury fields it is sufficient in most cases to run them down "strike outs." This, with the general uniform grade, gives sufficient command. The ditches are blocked at intervals while irrigating is in progress, and the water spills out on both sides, the pressure pushing the water out generally from ½ chain to 1 chain from the ditch before it finally flows down the general fall. It is possible with the quantity of water available to have three or four of these ditches irrigating at once. Two chains is the maximum distance that the ditches may be apart.

The total cost per acre of putting in these ditches is from 5s. to 10s.

Irrigating by the border-ditch method, one man can do from ¾ acre to 1 acre an hour.

It will be seen that, as these two methods involve cutting up the field to a certain extent, it makes them unsuitable for irrigating crops other than grass, as it is impossible to get harvesting-implements over the field. Further, a total cover cannot be obtained, and this would cause uneven ripening, and interfere with harvesting.

However, for already established grass the border ditch is the most satisfactory, and the results more than compensate for the making of the ditches, and, further, the ditches having been formed with a plough are easily filled in with the same implement should the necessity arise.

Fig. 4.—Part of a border-ditched field in the Levels area. Note the regular spacing of the ditches.

Border-dyke System.

(3) The border-dyke system is more suitable for comparatively flat land. Its preparation lies in the forming of strips or "borders" of land level at right-angles, and running parallel with the greatest fall of the land. These strips are contained by low ridges called "levees," which hold the water within the borders, causing it to flow in a sheet down the fall of the land. These "levees" are so rounded off that in a well-prepared

field they cause no more inconvenience than a strike out or feering. The head or supply ditch is situated at the top of the borders, and the water is fed into the borders by means of head gates. The width and length of the borders varies with the fall of the land and the amount of water available. On land having a big fall the borders must be narrow, but their length may be up to 25 chains. On land having only a slight fall the borders may be wide, but not more than 10 chains in length.

It has been found that in Canterbury, with 8 heads or cusecs of water available, the most efficient borders are those 40 ft. wide and from 12 chains to 14 chains long.

It will have been gathered from the foregoing that the method involves the moving of considerable quantities of soil in the forming of levees, the removal of knolls, and the filling-up of depressions. Its efficiency lies in the fact of the borders being level across the fall of the land.

Where the work has been properly carried out, a total cover can be obtained. The cost per acre is more than offset by the advantages of the method, which are as follows :—

(1) Any crop may be irrigated and harvested easily.

(2) Even, accurate, and quick distribution of the water (from 1½ acres to 2½ acres per hour can be done).

(3) It is permanent, in that the area can be ploughed, resown, and irrigated without any further land-preparation.

Border dyking can now be done at a comparatively low cost per acre. On the Levels scheme 300 acres have been bordered by the Public Works Department for farmers at costs varying from as low as 17s. 6d. to £2 per acre. This is made possible by using an automatic grader and the avoidance of manual labour.

As far as Canterbury is concerned, each farmer may have 4 acres bordered free of cost, provided he sows the area in a suitable permanent crop such as lucerne or pasture.

In the initial stages there was some comment as to the result of removing a portion of the top soil to form the levees. Results have shown, however, that there is no detrimental effect.

Thus it will be seen that very little difficult land-preparation and comparatively little cost is involved in order to make use of irrigation water. For quick results and small initial outlay the border ditch has proved highly successful, 800 acres having been done at Levels in the first year.

It is the method by which farmers will convince themselves to adopt the easier handled and more efficient border-dyke method.

—W. C. Stafford, Timaru.

Fig. 5.—Part of a border-dyked field after the levels have been cultivated down. Natural consolidation will reduce them to about 8 in. in height, and they will permit mowing-machines to operate across them.

Fig. 6.—Another view of the field shown in Fig. 5.

Fig. 7.—The Redcliff irrigation scheme, showing a contoured field in the foreground.

Watering of Drilled Crops.

OF the different systems of irrigation practised on flat land, the border system is usually recommended as the best and most efficient, where practicable, but this applies mainly to pasture, lucerne, red clover, or a cereal crop.

For any crop grown in drills or where intercultivation is necessary, then the furrow system of irrigation is the most practicable. This method can be applied equally well to "flat" country or to reasonably sloping hillsides. On the "flat" the drills will follow the fall of the land. On the hillsides the drills will run not vertically up and down the hill, otherwise scouring will result, but on an angle giving a gentle fall across the face of the hill. Excellent crops of mangels, potatoes, swedes, carrots, onions, and maize are produced by this method—in fact, this is the only method used in growing these crops in parts of Central Otago.

The lead race runs along the high end of the furrows, and water is directed into a number of them at the same time. During the dry period irrigations will be required from every ten days to twenty days, depending on the class of soil and frequency of mulching or intercultivation or at the first sign of any wilting of the crop.

—*G. G. Calder, Alexandra.*

Bledisloe Silver Challenge Cup Competition.

THE Bledisloe Silver Challenge Cup, valued at forty guineas, was originally presented by Viscount Bledisloe to the New Zealand fruit industry for competition at the Imperial Fruit Show, Southern Hemisphere, held in London.

This section of the Imperial Fruit Show has been discontinued, and Viscount Bledisloe agreed to allow the cup to be competed for in rotation at the autumn shows of the Auckland, Wellington, Canterbury, and Dunedin Horticultural Societies, provided such shows, for the year in which the competition is held, are to be deemed "National Shows" so far as this competition is concerned, and that the principal prize shall be the Bledisloe Silver Challenge Cup.

The control of the cup is vested in the New Zealand Fruit-export Control Board, and the Board has agreed to hand it over to the New Zealand Institute of Horticulture for competition at the autumn shows mentioned above.

The first competition in the Dominion was held at Dunedin in 1936, and last year it was held at Christchurch.

The next competition is to be held at the Wellington Horticultural Society's autumn show in the Town Hall on Wednesday, 27th April, 1938. Particulars of the competition are as follows:—

BLEDISLOE (FRUIT) CUP COMPETITION.

"*Class B.*—Two cases of Jonathan apples, packed and finished as though for export. First prize, Bledisloe Silver Challenge Trophy; second prize, 10s. Entries, which close on 27th April, are restricted to individual registered fruit-exporters. Entry fee, 1s.

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Horticultural Instruction.

Contributed by Officers of the Horticultural Division.

Fruit-export Work.

THE present month is probably the busiest of the fruit-export season. Mid-season varieties of both apples and pears will be ready for harvesting, and growers will find themselves taxed to the utmost to harvest the fruit when it is in the best of condition for export.

Reports to hand from various sources indicate that fruit is maturing earlier this season. This has been the experience with the earlier varieties, consequently it will be necessary for growers to watch each variety closely and commence the first picking somewhat earlier than is usual. In determining the correct degree of maturity to pick the various varieties of apples and pears, the Orchard Instructor for the district can be of great assistance to the grower. There is a proper time when fruit from different positions on the tree should be picked, when certain sizes should be selected, colour, maturity, &c., considered. When in doubt, growers should seek the advice of that officer, and act accordingly.

Although closing-dates for the different varieties in the different districts are set out in the Export Regulations 1938, it must be remembered that maturity is the deciding factor. With Jonathans, there appears to be a difficulty towards the end of the harvesting-period, especially with the larger sizes. Growers are apt to delay the final export picking in the hope that the colour will improve. This is done at the expense of maturity, which often leads to rejections at the inspection point. No grower should expect to be able to export every apple, therefore the best advice is to pick the fruit when ready for export, and pack it in the correct grade.

Considering the long distance export fruit has to be conveyed and the numerous handlings it is subjected to, fruit packed in an overmature state cannot be expected to reach its destination in first-class condition, with the result that such fruit will realize prices distinctly lower than fruit harvested at the proper stage of maturity. On the other hand, fruit picked before it has reached that stage of maturity to ensure it opening up in the best of condition overseas will wilt in transit, fail to develop the full flavour and appearance for the variety, and remain somewhat woody.

Large quantities of fruit will have already passed over the grading and sizing machines, and it is only reasonable to assume that certain parts of the machine will now be more or less dirty. Particles of grit, brought in with fruit from the orchard and collected on the grading-table, may be the cause of the unsightly markings often found on the fruit. These markings may not be evident at the time of packing, but show up very definitely in the course of a day or so, consequently care should be taken to see that all parts of the machinery are kept clean and free from dirt, grit, grease, or any other foreign matter that will detract from the appearance of the fruit.

Owing to the shapes of the different varieties, packers may find some difficulty when changing from one variety to another. This is most noticeable when inexperienced packers change from a conical to a more or less round or flat variety. Where the incorrect pack for the variety is used, the pack may be either too high or too tight, which will cause bruising. Particular care should be taken when handling and packing Sturmers, as this variety bruises very easily if not packed correctly.

"Eye-rot" appears to be very prevalent this season in almost all varieties of apples. Special care should be taken when the fruit is passing over the grading-table to see that no apple with any sign of this trouble in the "calyx" passes into the packing-bins. This disease spreads very rapidly, and one apple in a case affected with "eye-rot" may mean the breakdown of several before the fruit reaches its destination.

Local Markets.

With the large quantity of fruit available this season, there is no doubt that the local markets will be well supplied. Fruit intended for the market should be tree-ripened as far as it is possible. Unfortunately, too much fruit placed on the local market is in a more or less immature condition, thus creating a bad impression of the real qualities of our fruit. It would be well for growers to anticipate the new local market standard grades to be issued shortly, and to grade and pack accordingly. It should be borne in mind that fruit of inferior quality, packed in the wrong grade, not only has a very depressing effect on the market, with the resultant drop in price, but it is not fair to those growers who do their best to maintain the standards. When low-grade fruit is present in any considerable quantity, it lowers the price-level on that market, and in consequence good-quality fruit is penalized and brought down to a level below its value. It behoves every grower to do his best to place only good, sound, saleable fruit on the local market, packed and graded according to the official grades, and by so doing help to establish a market which should prove more beneficial to the producer than export.

General.

Fruit-trees budded during the month of February should be examined at this period to see whether the buds have taken. Any sign of wilting of the bud is an indication that the bud has failed to take. On account of the swelling of the stock, it will be necessary to cut through the ties at the back of the stock to prevent strangulation of the buds.

It may still be necessary to apply another spray on the late varieties of apples for the prevention of a late infection of black-spot. Recent weather

conditions have been favourable for the development of this fungus. Lime-sulphur (15 per cent. polysulphide content) at strength 1–180, plus colloidal sulphur 2 lb. to 100 gallons of water, should be applied. The addition of 1½ lb. of lead arsenate per 100 gallons will also assist to control leaf-roller caterpillar, a pest which does a considerable amount of damage to late varieties of apples.

At this season of the year a little time given to observing the results obtained either from pruning, spraying, thinning, cultivation, &c., will be well worth while. Any abnormal condition should be noted, and trees marked so that they may be attended to in the proper season.

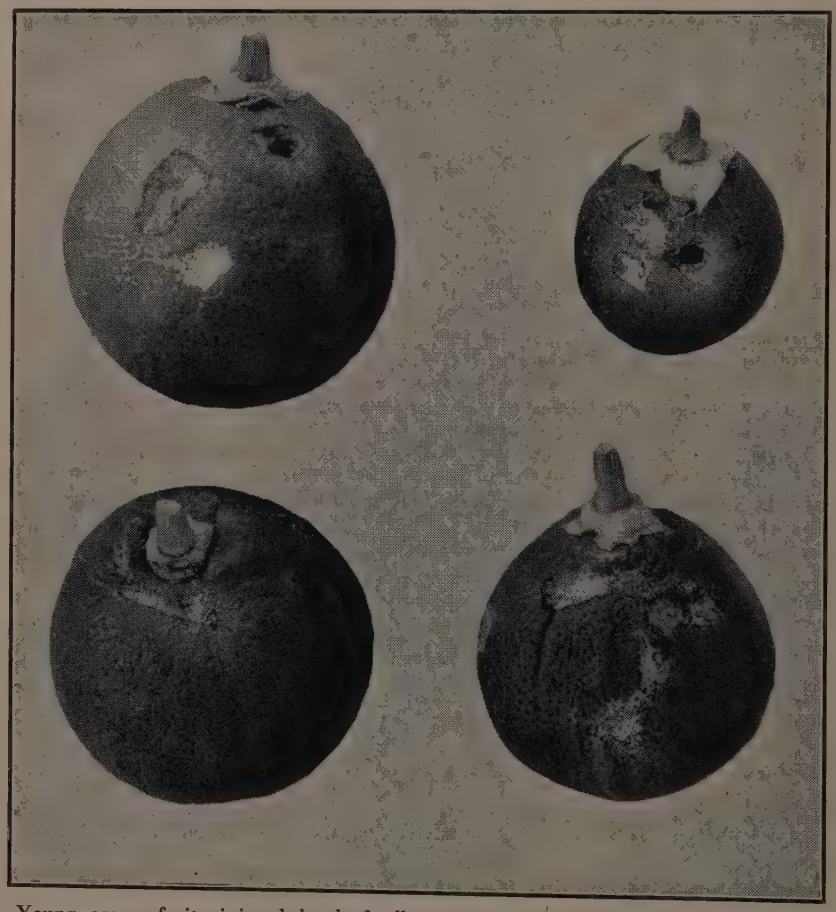
—Geo. Stratford, Orchard Instructor, Motueka.

Citrus Culture.

WHERE the planting of new orchards or extensions to existing ones is intended, full preparations should now be made.

It is a mistake to plant trees with the intention of making the necessary improvements afterwards, since in very few instances is it possible to do this thoroughly. If there is a sward of grass the first ploughing should be shallow, the furrows broken down with disks and left for a few weeks. When the turf is dead the land should be deeply cross-ploughed and, where necessary, sub-soiled. If patches of couch grass are present, these should be forked out and burned before the second ploughing. A further disking immediately prior to the planting of the trees should bring the soil to a fine tilth, which is so desirable for citrus. Drainage, and the provision of the necessary shelter, should also receive attention prior to planting. These matters will be discussed more fully in future notes.

The varieties to be planted should be decided upon, and the trees ordered from a reliable nurseryman as early as possible. Only well-shaped thrifty trees should be planted, and any inducement to purchase trees of a lower standard should be resisted. The lowest scaffold branches of a well-grown tree should be 1 ft. 6 in. above ground-level, and such trees should be insisted upon.



Young orange-fruits injured by leaf-roller caterpillar. Such fruits generally fall prematurely.

Rootstocks.

In ordering it is also important to stipulate the rootstock on which it is desired the trees should be worked. The lemon stocks which are in most general use in New Zealand are the citronelle and the sweet orange. The former has the disadvantage of being sensitive to cold and is susceptible to various diseases, whereas the orange stock does not produce quite such vigorous growth in the early years after planting. The sweet-orange stock is generally preferable to the citronelle for orange-trees, and in certain varieties produces a better-quality fruit. From certain overseas reports it appears probable that the sour-orange stock is likely to give the best results on rich loam soils; however, this stock has not yet been tried sufficiently in the Dominion to receive unqualified recommendation. The selection of the most suitable rootstock is of utmost importance in the establishment of any citrus orchard, and is a matter on which the advice of the local Orchard Instructor should be secured.

Varieties.

The most suitable varieties to plant in any locality is a subject that cannot be discussed at all fully in these brief notes, consequently your Orchard Instructor should be consulted on this matter also. The citrus districts of New Zealand are all approaching the southern limits of the zone in which sweet oranges may be successfully cultivated, and this fact has a decided bearing on the varieties of orange likely to prove most profitable. Good-quality fruit of many early and mid-season varieties is obtainable in season in suitable localities, whereas the quality of certain well-known late varieties is generally below the standard obtained in most other orange-producing countries,

Diseases and Pests.

Lemon orchards wherein verrucosis is liable to be troublesome should be sprayed during the autumn blossoming period with Bordeaux mixture 3–5–50. It should be remembered that the disease infects the fruit only during the early stages of growth, consequently spraying is necessary at this period to ensure a clean summer crop.

Red scale in some districts became active earlier during the present season than is usual in a normal year. At the time these notes appear the second generation of these insects can be expected to have made their appearance should the weather continue to be favourable. The presence of young scales during the month of April is an indication that a further application of summer-oil 1–33 should be applied.

Leaf-roller caterpillar should be guarded against at this season of the year, especially in oranges. Periodical applications of lead arsenate (powder) 1½–100 will effect a satisfactory control.

Frost-protection.

Damage by frost is often more serious than is realized. This applies particularly to lemons, where a moderately light frost on occasions causes a heavy dropping of the young fruit, thereby appreciably reducing the next summer crop. Whether the danger of frost injury warrants the expense of installing modern frost-prevention equipment or not is a matter that must be determined by the individual grower.

—P. Everett, Orchard Instructor, Gisborne.

Viticulture.

CAREFUL attention should be given to the cutting-out of cracked or diseased berries. Owing to the recent humid climatic conditions, grey-rot (*Botrytis cinerea*) is of fairly frequent occurrence this season, especially in vineries where ventilation is insufficient, a not uncommon state of affairs in the Auckland suburban districts. In the early stages ½ oz. of liver-of-sulphur dissolved in a gallon of water will check the fungus, but prevention by adequate ventilation will be found effective in most seasons.

Quite a number of shanked berries have been forwarded during this season for identification and advice as to treatment. The symptoms are easily distinguished: withered stems, berries failing to ripen and having a decidedly bitter flavour. This condition is due to lack of food owing to too much water at the roots or to the roots having got down into sour cold clay.

When all the grapes are gathered the roots can be lifted and given a fresh start in good soil in the following manner: cut a trench deep enough to uncover the roots about 12 ft. from the vinery and parallel to it. Sever the roots, and carefully remove the soil from these, working towards the house, in the meantime covering the roots with wet sacking and syringing the vines in the house daily to prevent drying out. Shading the vines for about three weeks until the roots commence to grow again is also a decided advantage. The old soil from the border should be removed to a depth of about 18 in. A layer of good soil 9 in. deep in which no vines have been previously grown and to which has been added a ½ cwt. of bone-meal is laid in the bottom of it and the vine roots turned back towards the house—notches being cut along the thicker parts of the roots at intervals of from 9 in. to 12 in.—and laid upon it. From the notches new roots will form. The roots are then covered with another 9 in. of good soil and bone-meal, which is well watered and covered with a mulch of old hay or straw.

The above method gives wonderful results in giving a new lease of life, with good crops, to old and failing vines.

Vineyard.

Since writing last month the weather has changed considerably. Heavy downpours, intermingled with lighter showers and heat, have produced ideal conditions for the development of fungous diseases. Diseases were very much in evidence during a recent visit to the far North, where, strange to say, a number of vineyards are shut in and deprived of free circulating air by close shelter, or are planted in hollows producing similar conditions.

If these unfavourable weather conditions continue, it is probable that grapes nearing ripeness will be attacked with grey-rot. As it is useless to try and control this disease at this period, the only alternative in order to save at least some of the crop will be to crush and press the grapes and ferment the juice apart from the skins, making a white wine with both coloured and white grapes. The juice should be separated from the berries as quickly as possible, and 6 oz. of metabisulphite mixed in hot water in a wooden or enamel vessel added to each 100 gallons of the must. This will exterminate all undesirable ferments and destroy the oxydase, which is the cause of "brown casse" in red wines and the yellowing and browning of white wine. When the must has reposed for forty-eight hours, draw off the clear liquid into vats or barrels. Add a little fermenting must from a starter prepared for the occasion from sound grapes, and 1½ oz. of tannic acid per 100 gallons. When racking later, run the wine into well-sulphured containers. Crops that have suffered badly from downy-mildew and oidium should be treated in the same manner.

It is an interesting fact that this undesirable rot under ordinary conditions is welcomed in some of the European viticultural districts—Sauterne, Rhine, and Anjou—where the principal varieties, Sauvignon, Semillion, Muscatelle, Riesling, and Chenin Blanc, which have resistant skins, are grown. In these districts, where a dry autumn is the rule, the fungus, by diminishing the thickness of the skin, allows some of the water of the grape to evaporate, and at the same time develops a particular aroma which is considered desirable in this class of wine. Under these conditions the fungus is known as *pourriture noble* (noble rot).

The advice given in last month's *Journal* applies to some extent to vineyard culture in this month, and might be read in connection herewith.

Cellar.

In hot countries like parts of Australia it is necessary occasionally to reduce the temperature of fermenting must, but such precautions in New Zealand are uncalled for—in fact, in late vintages fermentation is often retarded to some extent by cool autumn weather. Ideal conditions lie between a fermenting must temperature of from 70° to 90°, and these conditions usually exist without resort to any artificial means. We are, moreover, blessed with a very vigorous type of local wine ferment or ferments, as it is generally accepted that fermentation is due to several types of ferments. A production of 17 per cent. to 17½ per cent. by volume of alcohol is not unusual.

—J. C. Woodfin, Vine and Wine Instructor, Te Kauwhata.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticultural Division.

SPRINGTIME is always a busy season on the farm, and the frequent showery periods experienced often cause serious delay at that season in the preparation of the soil for cropping, especially when it is of a heavy character. In such circumstances it is best to make an early commencement in the preparation of the land for early crops, such as potatoes, peas, salads, &c.; also permanent crops that are planted early in the season, such as asparagus and rhubarb.

Most of these crops thrive best with a liberal dressing of farm manure, which should be ploughed under as soon as the land is available now, together with any of the slow-acting fertilizers which may be required, such as basic slag, Kainit, blood and bone, or fish manure. Other plots for later cropping which are free now may be ploughed, harrowed, and sown down in a hardy green cover-crop, such as oats and horse beans, for ploughing in later, or simply double ploughed or trenched in preparation for sowing root crops. Intensive cropping has a strong tendency to deplete the stores of lime in a soil, and a moderate annual dressing, or a heavier one at longer intervals, is required to keep acidity within reasonable limits or to create such alkaline conditions as many crops prefer, as, for instance, the cabbage family. Lime is now usually applied in the form of a finely ground limestone of good quality; fine grinding is important. About 1 lb. to the square yard or 2 tons per acre is a normal dressing at intervals of three or four years. When slaked burnt lime is used, about half that quantity will usually be sufficient. For best results the lime is broadcasted after ploughing and harrowed in during the autumn. This attention is too often overlooked: it is of special importance on heavy land of a naturally acid character. To complete the preparation of the land after this treatment for sowing in early spring, all that will usually be required is to broadcast or drill a dressing of soluble quick-acting fertilizers such as superphosphate, sulphate of potash, and sulphate of ammonia, and cultivate it in a few weeks before sowing.

Where the land to be used for cropping is in grass it should be skim-ploughed without delay, and the turf allowed to rot before it is ploughed under deep. Land with an open subsoil is sometimes overdrained, especially in the drier localities. Heavy land, however, especially when low lying, will require draining. It is a heavy task, but it will save much labour later and return better crops if a well thought out scheme of drain-pipes to collect the surplus water in the subsoil and open drains to carry it away is properly carried out.

There are few localities here where vegetable crops do not require the shelter of hedges to protect them at least from the prevailing winds. The preparation of the land and early winter planting of carefully selected plants should be carried out and maintained with all the attention one gives to the most important crops. Plants for shelter purposes are best chosen of a natural height at maturity that is suited for the purpose, as far as possible, in order to reduce the labour and cost of maintenance.

Crops for Present Planting.

Crops planted at this season are cabbage and cauliflower for spring cutting. A piece of land well drained, clean, and generously manured for the previous crops is best suited for these crops, which should be planted deep and firmly. In the cooler districts the cauliflower-plants are sometimes best pricked out 2 in. apart on beds which can be covered with a frame to protect them from severe weather until the worst of it is past. It is also a suitable time for planting mushroom-spawn in beds of well-prepared compost. Under good conditions mushrooms may be expected in one or two months, when the outside crop is finished. The most important condition is the maintenance of a temperature of 50° F. to 60° F. This cannot be done at this season in a draughty shed, especially in a wet, shaded place, unless the beds are on the floor and well covered up with straw and canvas covers. For winter and spring cropping, which are the more important seasons, a warm, well-drained, and sheltered position is most suitable for sheds for mushroom culture. In such a position high summer temperatures will make cropping difficult, but with a varied supply of fruit and vegetables of many kinds at that season this is not so important. Other plantings of this class which may be done now are some of the perennial herbs such as chives. In a good moist soil, planted 6 in. apart, they produce a rush-like grass that is of the greatest use for salads and seasoning, by imparting to dishes a mild onion flavour in a most convenient form. Lifted, broken up, and planted in fresh ground every third year, it provides a generous supply with little trouble. About a back-country whare or seaside cottage, as well as at home, it will flourish with little or no attention, and is a most useful plant.

Asparagus and Celery.

As soon as the mature growth on an asparagus plantation changes colour it should be mown, raked, and burnt, and a slight ridge thrown over the stubble to rot it. As the celery crop approaches full growth it should be blanched by earthing it up; it is best done in two or three stages in fine weather.

Towards the end of the month of April a sowing of broad beans is sometimes made, and, in localities practically frost-free, culinary peas for harvesting in early spring. For this purpose a good main-crop variety, such as a good strain of Stratagem, is used. Lettuce for planting out in early spring is sometimes sown, but it will usually require the protection of a glass frame which requires considerable attention to be successful. A thin sowing should be made on a raised bed or in boxes, the latter having the advantage of facilitating transport of the plants

when setting them out. The soil should be only moderately rich in humus and not have grown lettuce for a season or two. Give a dressing of bonedust when the boxes are half-filled, and when the seeds are covered place the glass lights in position and keep the frame closed until the seeds are well up. Then harden the plants off and ventilate freely on all suitable occasions—not merely some, but all occasions that are suitable. Remove the lights on fine days, but cover at night and when rain threatens. Avoid overhead watering and rain, but ventilate freely at night except during a hard frost. It is satisfactory to know that research work is being carried out at the Imperial College of Science in the control of rust disease of lettuce, *Marssonia panattoniana*, which is so troublesome in winter crops. Results so far indicate that the trouble is seed borne, and a suitable seed treatment is being sought.

Small and Sundry Fruits.

Late tomatoes often meet a good market demand. Where the weather is cold, colouring of the fruit is slow, but if mature it may be hastened after picking by placing it in a cabinet heated to a temperature of 65° F. to 75° F. In preparation for the new season's crop the compost for the seed-boxes should receive attention. Messrs. Lawrence and Newell, of the John Innes Institution, have given a great deal of attention to this matter, and have demonstrated with a number of annual herbaceous plants that it is best to sterilize the ingredients in a compost for seedlings separately, and to mix them afterwards. They obtained very striking results. They found it quite the best to always add phosphates when mixing, preferably in the form of superphosphate of lime (basic phosphate) at the rate of 1½ oz. per bushel of compost. If the sand is clean it need not be sterilized, or, on the other hand, the sand and loam may be sterilized together without detriment.

Manurial treatment of established plantations of bush fruits will vary according to circumstances. In most cases it will probably take the form of a dressing of well-cured farm manure or other organic material lightly ploughed under now, unless it has been already done this season, and a dressing of artificial fertilizers in the spring. Great care must be taken with the cultivation not to exceed what is customary as regards depth, as the roots of these plants are fibrous and often very close to the surface. The profitable life of these crops under average conditions does not exceed ten years, and as that term approaches it is best to make a new plantation on fresh land so that it will come into bearing when the older plantation is grubbed out.

The preparation of the land for planting most kinds of bush fruits should now be completed, so that it may settle and receive light cultivation to destroy seedling weeds before planting towards the end of the month of May. For a domestic supply on the farm a small sheltered area is best reserved for these and other perennial crops, as they then crop better than when planted about the vegetable garden and are subject to disturbance in the course of general cropping. Small fruits which are planted in the spring and early summer include loganberries, tree tomatoes, passion-fruit, and Cape gooseberries—most other kinds are best planted in early winter, although early spring is also a suitable period.

Harvesting and Curing Nuts.

Where edible nuts are grown, the grass under the trees should be mown and the surface smoothed out in the most suitable manner to facilitate harvesting. Then, as soon as the nuts commence to ripen, the trees should be well shaken with long forked poles at intervals, and the nuts gathered. Leaving them on the ground exposed to dews and rain even for a short period is injurious to their appearance and very often their quality also. Even when gathered promptly they should be well cured by drying them off well before storage. This is done in a well-ventilated shed or in the open, the nuts being placed in trays 6 in. or so deep with slatted bottoms, and well stirred from time to time. If the curing is done outside, the trays should be stacked at night and covered to keep them dry. In this way a sweet, bright sample is obtained. When cured, the nuts should be put over a riddle to eliminate waste and undersized specimens before marketing. Nuts required for planting should not be dried, but stratified in damp sand or sandy soil until sown in the spring. In different parts of the country very good sweet almonds, walnuts, chestnuts, and hazelnuts are grown, and there are few places where one or the other of these useful supplies may not be produced with comparatively little trouble.

Herbaceous Flower Border.

In this section at this season the herbaceous plants and lawns demand most attention. As the summer annuals finish blooming they are cleared away and replaced with wallflowers, stocks, violas pansies, polyanthus, &c., which have been grown in preparation for the occasion; or tubers of ranunculus and anemones; or bulbs of early flowering gladiolus, hyacinths, tulips, daffodils, &c. In well-prepared beds these plants soon make a good display of varied colours which continues well into the summer.

Borders of herbaceous perennials are cleaned up, additions and adjustments made, and a dressing of well-prepared organic manure applied and lightly worked in. Lilies, irises, carnations, and lily of the valley are among the many subjects which may be planted now. Carnations thrive best in an open position in a rather dry atmosphere, firmly planted in a soil that is well drained and not too rich in humus. Most lilies prefer semi-shade, especially in warm, sunny localities. Lily of the valley is definitely a woodland subject, and must have shade to flourish satisfactory. Among irises the bearded section like a sunny position that is comparatively dry, and an abundance of lime; the Japanese varieties do not like lime, and a cool, moist position suits them best. For this reason they are often chosen for planting on the verge of a pond or on the banks of a stream.

In nature, herbaceous plants maintain their condition by "creeping" on to fresh ground by means of suckers, runners, or scattering their seeds. As in a well-managed garden border this is not permissible, the matter is arranged by lifting the plants every three or four years, reconditioning the border, and replanting so that as far as possible a fresh position is given to each kind. This may be done now or in early spring. Where the undertaking is of considerable dimensions, both periods will probably be required to complete it. The main points are to conduct the removal to temporary ground in a methodical manner so that labels and plants are not lost; and thoroughly clean, cultivate, and manure the soil in preparation for replanting. Planting naturally affords an excellent opportunity for exercising one's taste and skill in the arrangement; but for the inexperienced it might be added that large masses of one colour may be overdone and become monotonous. That very fine plant gazania is often treated in this fashion, or the colours are so intermixed as to destroy all effect. It is generally most effective to plant in relatively large groups of one variety, the size of the group depending on the proportions of the border and the garden about it. Another point is, however fine a subject one may have to plant, the effect it produces is going to be greatly enhanced, or discounted, by the environment it is given. For busy people, it is generally best to confine oneself, in this section, to plants of a height and strength of stem which require little or no staking and tying at any stage of growth; the labour of maintenance is thus greatly reduced.

Lawns New and Old.

When the grass on new lawns is well through the ground, it should be rolled, when the surface is dry, with a light roller weighing about 2 cwt. Later the grass should be cut with a machine that is properly adjusted and lubricated, with the cutting-knife set to cut high, so that the grass is left comparatively long. When the grass is well established closer cutting may be done gradually in the springtime.

On established lawns and greens repairs and attention referred to last month should now be carried out as soon as possible, so that the full effect of the treatments may be obtained without delay. On light land especially, feeding should be to a great extent done with organic manures; but to some extent it must be supplemented with artificial fertilizers to obtain the best results. In the absence of data to the contrary, the mixture found by the Green-keeping Research Committee to be so beneficial at this season may be tried—viz., 3 parts superphosphate, 4 parts sulphate of ammonia, and 1 part finely ground sulphate of iron, applied at the rate of 1½ oz. per square yard, mixed with fine top-dressing soil to facilitate an even application.

For the control of earthworms and grass grub, 1 oz. of arsenate of lead powder per square yard of turf, mixed with the top-dressing and well rubbed in, will generally be found a satisfactory remedy. For earthworms alone, blue-stone solution 1 lb. to 100 gallons of water applied at the rate of 1 gallon per square yard is effective if applied in dull, moist weather when the worms are near the surface. For the subterranean caterpillar, which lives underground and feeds on the grass at night, a suspension of arsenate of lead 3 lb. to 100 gallons of water applied during calm weather, sufficient to thoroughly wet the grass, may be applied.

—Wm. C. Hyde, Horticulturist.

Tobacco Notes.

DURING the month of February the weather has been exceptionally hot, with two heavy downpours of rain that could well have been done without, as it rather interfered with the routine of harvesting operations—barns were emptied, but unable to be refilled on account of the rain. However, the great heat experienced has been very beneficial to tobacco ripening, and last month was infinitely better than February, 1937. Many growers co-operate with one another in the harvesting of the crop, and work in a rotation with, say, four barns, using the same labour to pick, tie leaf, and load barn. In fine weather this arrangement is very satisfactory, as about one day lapses between each loading. On this day attention is given to removing laterals, and ordinary farm-work. It can be readily seen how three days' rain can disorganize the whole system, and cause inconvenience to the growers, particularly as there is insufficient labour to meet all requirements. About half of the crop of tobacco leaf is now harvested, and some very nice leaf is bulked down in growers' sheds.

There have been three outbreaks of fire in tobacco-kilns this month, one barn being totally destroyed with contents. In the other two the contents, valued at some £80, were destroyed, but the buildings were saved. All of these kilns were covered by insurance, which is the universal practice in this district.

A site for the export tobacco bond store to house the Proctor re-drying machine has been bought in Motueka, and is now ready for building operations. The tenders for the building closed on the 1st March. Growers are looking forward to the establishment of this modern plant in the district; it gives additional confidence in the future of the tobacco industry.

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Work for the Month in the Apiary.

Removal of Supers.

AMONG the autumn work which must not be neglected is the removal of the supers, and this should be undertaken as soon as the extracting-combs are cleaned up by the bees. It is bad management to leave the bees more space than they can occupy. By removing the supers the space in the hive is restricted, and consequently it is much easier to make the bees snug and warm for winter. Where the strength of the colony will permit this to be done nothing is to be gained by leaving on the supers. However, it may be impossible in the case of strong colonies to confine the bees to the brood-chambers, in which case the supers can be left on the hives until the spring. By that time most of the bees will be in one story, and the supers can then be removed.

A good plan to follow in getting the bees to clean up the combs is to insert a mat, in which a small hole has been cut, between the brood-chamber and the super. The bees, finding the combs partly cut off by the mat, lose little time in removing the surplus honey. At this operation the excluders should be removed from the hives and stored away until such time as they can be cleansed of burr combs. A little care is necessary in dealing with the excluders, so as not to bend the wires. They can be readily cleansed by plunging into boiling water.

Winter Stores.

The losses attendant upon starvation are no less serious a menace to the beekeeper than disease. While disease is met from time to time, each autumn brings the problem of wintering the bees. It has to be faced every winter, and, while the professional will prepare his colonies so as to guard against serious losses, the average beekeeper is apt to overlook the essentials that make for success. There are factors such as shelter, watertight hives, vigorous young queens, &c., which all play a part in the wintering problem; but, above all, a supply of food sufficient to meet the colonies' wants must not be overlooked. The safe wintering of bees is a test of a beekeeper's capabilities, as he is called upon to gauge the amount of stores required to tide his bees over the period between the autumn flow and the appearance of the early nectar-secreting plants. Locality plays an important part, more especially where autumn flows are unknown and fine autumn weather prevails. In these districts the consumption of stores is greater, and a constant watch must be kept on the hives so as to determine the amount of food required to guard against loss, as breeding will be carried on until a later period in the season.

Various estimates have been given as to the amount of food required to winter the cluster—varying from 30 lb. to 40 lb.—and experience has proved that, providing a colony is left with this amount, it will not only winter well, but will build up rapidly in the spring. In any case, it is by far the safest policy to leave an excess of food rather than run the risk of leaving the colony short and with barely enough to tide it over the dormant period. Where the amount of stores is less than 30 lb. the shortage can be made up quickly by the insertion of a few combs of honey. Calculating on the basis that a full comb contains 5 lb. of honey, it is easy to estimate the weight of honey in the hive. If, however, combs of honey are not available, feeding should be undertaken. This latter operation should not be delayed till the cold weather, but commenced early in the autumn.

For supplementing the stores sugar-syrup, fed in the proportion of two of sugar to one of water, is the best substitute for honey. Avoid using inferior qualities of sugar. None but the best white sugar should be fed. In feeding to augment the winter food-supply it is often necessary to feed large quantities of syrup, and consequently large feeders must be adopted. The Miller and the division-board feeders are excellent for the purpose. The former enables about 10 lb. to 25 lb. of stores to be fed at one time. It is designed to be placed inside the super or upper story on top of the brood-frames, and has two compartments for syrup, the passage-way for the bees being in the centre through the bottom, directly over the cluster. The division-board feeder is popular, and enables about 5 pints of syrup to be fed. Hanging between the frames, all that is necessary is to turn back the mat so that the opening in the top is exposed. The main advantage of this feeder is that food can be supplied without exposing the cluster and without the aid of smoke.

Shelter.

As in the spring, a vital necessity at this time of the year is shelter for the hives. Brood-rearing must be encouraged if the bees are to go into winter quarters sufficiently strong to give good results the following season. If a sheltered hedge or fence has not been provided, an excellent temporary breakwind of manuka scrub can be erected. Shelter without too much shade is the life of an apiary, and on no account should large trees be utilized as a means for protecting the hives. The spaces between the trunks are productive of draughts, and the high branches exclude too much of the sunlight. A line hedge 8 ft. to 10 ft. high is the ideal shelter for an apiary.

Foul-brood.

Every effort should be made to winter only clean colonies. The risk attendant on carrying over diseased bees is too great, as the trouble is more likely to be spread in the autumn and spring by robbing. In cases where weather conditions have presented successful treatment, or in which disease is detected on making a final examination prior to putting the bees into winter quarters, it is advisable to remove all combs showing the slightest signs of disease. Where disease is detected in a bad form nothing will be gained by holding the colony over for treatment, and it is by far the safer plan to destroy. In minor cases remove all the diseased combs and substitute clean drawn-out extracting-combs, and, provided plenty of capped stores are given, this will tide the colonies over until the spring. Mark all infected colonies as a reminder for early treatment. Avoid disturbing diseased hives in the off-season and guard against manipulations calculated to disturb the bees and induce robbing.

Bottom-boards.

Among the work requiring attention in the autumn is the cleansing of the bottom-boards. This operation can be undertaken before finally closing down the hives for winter. Usually there is an

accumulation of pollen, wax particles, and dead bees, and, if left, this material is likely to become mouldy and offensive to the bees. All operations should be carried out as quickly as the work will permit. A good plan is to provide a spare bottom-board. Lift the hive on to the spare one, scrape the old board, and replace the hive.

Spare Combs.

It is a frequent statement, and a true one, that next to his bees a beekeeper's most valuable asset is his drawn-out combs. Complete combs of worker cells are absolutely necessary to the proper working of an apiary and merit careful treatment at the hands of their owner during the off-season. They should be stacked in the supers inside a mouse-proof structure, and to still further guard against the attacks of mice each stack of supers should be covered with a queen-excluder. A few moth-balls scattered among them will prevent the attacks of the smaller wax-moth (*Achroea grissella*). Where accommodation cannot be found for the combs indoors they may be left in the hives over a mat placed between them and the brood-chamber, but in this latter case they must be weighted to prevent the winter gales from dislodging them.

Robbing.

Where the extracting has been completed in good time and every care taken to remove temptation from the bees' path there should be little or no danger from robbing. However, where the honey has been left in the hives till late in the season the act of opening the hives and removing the full combs is apt to arouse the bees predatory instinct. On no account leave combs exposed one moment longer than necessary, either before or after extracting; carefully wipe any honey which may be spilled on wheelbarrow or other utensil in use at extracting-time and see that every means of ingress into the disturbed hives is closed as soon as every manipulation is completed. Be sure the roofs are put on securely and that no robbers can crawl under them.

If robbing should take place in spite of all precautions the apiarist should realize that he must take means to eradicate the trouble at once if he does not wish it to spread right through the apiary. He must realize that autumn robbing is very serious and may tend to materially deplete his stocks before the bees settle down for the winter. The veriest tyro, by a little study of the entrance of a hive, can soon decide whether the colony is being robbed or not. Sometimes the young bees in their play-spell during the warm hours of mid-day may, at a casual glance, resemble a robber horder, but on closer examination the beekeeper will see that in such a case there is no struggle and consequent slaughter taking place at the hive-entrance. Moreover, there will be a steady stream of workers in and out of the hive intent on gathering the last of the failing honey-flow. Perhaps the surest indication of the well-being of a colony is the stream of pollen-bearers which every hive should have while the flowers last. If the apiarist sees the bees carrying in pollen without interruption he may conclude, whatever the excitement at the entrance, that the colony is not the victim of a hostile attack.

When robbing takes place in earnest perhaps the first indication the apiarist gets is the noise the bees make. No other sound in an apiary is like it. It gradually develops into a steady purposeful roar, loud and aggressive, and in a short time the unfortunate colony will be assailed by a cloud of bees flying steadily at the hive fighting with the inmates and with each other and strewing the ground with the dead and dying. The beekeeper should at once contract the entrance of the hive until only two bees can escape at once. He should then pile wet grass high over the alighting-board, completely covering the entrance, and the grass must be kept wet. The bees outside will not force their way through the wet grass, and by the time those inside escape they will be glad enough to get out and stay out.

If bees persistently hang around a hive it is well to examine it as quickly and thoroughly as possible. Bees seem to have some uncanny instinct which tells them when a hive is weak or queenless, and if they persistently hover around one particular colony it is usually a warning to a beekeeper that all is not well within. On examination the colony will usually prove to warrant removal by being united with one stronger and better able to guard itself. If a colony of this kind has to be opened, any frames which are removed must be kept covered with the carbolized cloths mentioned as useful at extracting-time.

One other matter to which the beekeeper should give his attention when the bees are inclined to rob is the protection of his honey-house. The windows should be provided with bee-escapes, so that all intruders may easily be removed, but on no account must there be any holes through which they can re-enter. Bees robbing a hive are bad enough for any beekeeper, but bees robbing a honey-house are like all the wild animals in a menagerie let loose and the beekeeper who once allows this state of thing to happen will usually reap his reward in the shape of innumerable stings from his infuriated subjects.

—E. A. Earp, Senior Apiary Instructor.

A useful shelter-belt of poplar which provides top shelter with gorse for bottom shelter. This runs east and west and provides excellent shelter on the southern side of an orchard.

Poultry-keeping Section.

The Moulting-period.

THE present time is the season of the year when most hens shed their old and grow a new coat of feathers. On an average, it takes a bird about three months to go through this process. It is nature's method of assisting to keep birds clean and healthy, and although moulting is a natural process it is a drain on the system, and for that reason good care should be taken of the birds during that period.

Unfortunately, some poultry-keepers are inclined to be of the opinion that because hens are not laying they do not need the same amount of feed and attention. It is true that fowls, while shedding their feathers, do not consume the same amount of food as when in full lay; however, they should be given what they require, and as the moulting process advances it will be noticed that their appetite becomes keener. This should be satisfied, though the feed need not be as strong as when birds are laying.

While suggesting that a good feed-supply should be kept up during the moulting-period, it is well to keep a watch on the birds and see that they do not get over-fat. In order to guard against this, some should be handled from time to time in order to ascertain their condition.

As green feed is a fowl's natural tonic, a liberal supply should be given each day. Another important item is to see that the birds are free of internal and external parasites.

Protection from wet, cold, or windy weather should be provided, and houses should be comfortable, well-ventilated, free from draughts, dry, and of sufficient size to accommodate the birds without overcrowding.

Given ordinary good care, the great majority of birds will go through the moult with not much trouble, but any neglect is likely to prolong the process and keep hens out of production for a longer period.

Care of Pullets.

Owing to the moulting-period, few eggs can be expected from hens for the next three months, and poultry-keepers must depend upon their pullets for the egg-supply during the off season.

The well-managed plant usually carries about twice as many pullets as hens at this time of the year, for experience has taught that unless sufficient good pullets are reared each year it is almost impossible to make a success of egg-production. It is safe to say that more failures in the poultry business may be attributed to this cause than to any other. It is not always a case of insufficient numbers, but often the quality is not up to standard.

Nothing will make more culls amongst growing stock than overcrowding, and this is a weakness on many plants to-day. It is a great mistake to attempt to rear more birds than one has accommodation for. Where plants are at all overcrowded, it will pay to dispose of all surplus pullets, and keep only that number of good birds

Two leghorn pullets six and a half months old which were hatched at the same time and reared under the same conditions.

which can be allowed about 4½ square feet floor-space house room, and from 8 in. to 9 in. each perch room.

Culling Pullets.

It takes experience to make a good job of culling pullets, but all weedy late birds that are not likely to come in to lay till the winter months are over are better off the plant, the extra room and attention being given to the better birds.

Never sacrifice quality for quantity.

Several cases have come under the notice of the writer where poultry-keepers, some through overselling, others owing to some mishap during the breeding season, have finished up with less pullets than usual, and they have been concerned over the matter, considering that their autumn returns would be adversely affected. In most cases, what was considered a misfortune turned out a blessing, as the lesser number of birds, having more space, gave better returns than the usual larger numbers in the same house, thus teaching a valuable lesson which should not be forgotten.

Feeding Pullets.

Each season letters are received from poultry-keepers asking advice as to why their pullets, which in some cases are well over seven months old, are not laying, though they look bright and healthy. In many instances the trouble has been due to the fact that not quite sufficient feed has been given, for when the feed-supply was increased, as suggested, the birds soon came in to lay. Pullets should be well and regularly fed, and care should be taken to see that plenty of trough feeding-space is provided so that all birds can feed at once, otherwise the younger or more nervy birds will often have to go short.

Some poultry-keepers favour keeping their birds just on the hungry side, but better returns will be obtained if they are given as much as they will clean up in about half an hour, more losses being due to underfeeding the laying bird than overfeeding. As the days become shorter, it is well to see that pullets are fed as soon as possible in the morning. Every care should be taken to avoid giving laying pullets any sudden change in the way of feed or quarters, for it takes very little to put them into a false moult, especially at this time of year. The less they are handled the better, but if it is found necessary to handle them do so as carefully as possible.

When just about to come into profit, pullets are usually more nervy than at any other time, so it is advisable to go amongst them carefully, talk to them when you enter their pen, and do all you can to get them tame and gain your confidence.

Some people state they they do not care for Leghorns because they are too nervous and flighty. It is true that some strains are inclined to be more nervy than others, and as a rule Leghorns are more flighty than the heavier breeds, but still it is wonderful what can be done and how tame even Leghorns will become with a little care.

Maturity.

The chief visible difference between the two birds in the accompanying photograph is that the one on the left has come to maturity—in fact, had been laying for about three weeks—before the photograph was taken, while the one on the right, judging by its general appearance, would not be laying for some three weeks or more.

The bird on the left is a good type of standard bred Leghorn pullet, it has body size, length, depth, and width. The tail is carried at a nice angle. The head is inclined to be long, yet it shows strength, character, and fineness. Feathering is tight and dense. Legbone inclined to be flat, yet strong. The general balance is good. It possesses all those visible characters that go to indicate production, and when she comes to her second season should be a most suitable breeder. This is the class of bird that should be selected for egg-laying tests.

The bird on the right, though of fair size, has not the length or depth of body. The head is small, inclined to be short, round, and coarse. The eyes, small with little expression, and rather sunken. The feathering is not so well developed or dense. The legbones inclined to be round and coarse. When this bird was handled it was rather lighter than it looked, and was not so fine in texture, and is not the class that would be expected to give a good egg-yield.

The writer's experience during some seven years of trap-nesting was that if well reared Leghorn pullets did not come on to lay till after they were six and a half months old they very seldom put up a good score.

Early Maturity.

While maturity is a guide to production, and it may be said that fairly early maturity is a good guide to good production, care must be taken not to carry this point of selection to excess.

If the poultry-keeper continually selects on this point and does not pay due regard to other important characteristics, he will find, first, that the size will diminish, and then that the stamina and constitution of the birds will go. The danger line is reached when a number of pullets come to maturity between four and a half months and five and a half months. It would indicate that some fresh blood was required. It is much better to see Leghorn pullets coming on to lay between five and a half months and six and a half months old.

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N.Z. Federation of Young Farmers' Clubs.

Edited by S. Freeman, Dominion Organizing Secretary.

Team in Australia.

THE New Zealand touring team arrived safely at Sydney after an enjoyable trip in the "Awatea." In a letter received recently, Mr. C. M. Whatman, leader of the team, pays a tribute to the wonderful hospitality extended in Australia to the members of the teams from both Great Britain and New Zealand. The New Zealand lads were met at Sydney by Mr. Simmons, Hon. Secretary, Junior Farmers' Clubs of New South Wales, who took them in charge until the train left for Adelaide in the evening. During the afternoon they met the Director of Agriculture for New South Wales (Mr. Macdonald), the Director of Education (Mr. Cambridge), and Mr. Brickwell, Junior Farmers' Club organizer.

Fig. 2.—Members of the Empire Y.F.C. Party at present touring Australia. (Taken on board the s.s. "Strathmore" at Melbourne.)

From bottom: C. M. Whatman (N.Z.); E. Christopher (England); R. Gamble (N. Ireland); E. Williams (Wales); H. McKenzie (N.Z.); T. Gilmore (Scotland); A. Cowan, A. Viles, and A. Fisher (N.Z.).

The thirteen hundred miles' train journey was apparently very tiring, entailing, as it did, two nights on the train. The party was met at Adelaide by Mr. Aidey (Director of Education for South Australia) and Mr. Hilton (Agricultural High School Headmaster), who had charge of the touring arrangements in South Australia.

Mr. Whatman continues in his letter as follows: "The people whom we were billeted with in Australia treated us as their own sons, and could not have done more for us. We met here the British boys for the first time and quickly became 'blood-brothers,' although at all times we are very loyal to our respective countries.

"South Australia is noted for its wonderful fruit, and it was just as well that there was a big crop considering the way our party could eat peaches, pears, grapes, passion-fruit, apples, oranges, &c. The South Australians no longer wonder why New Zealand takes so much of their fruit.

"The South Australian merino is entirely a type of its own, being much stronger, bigger, and deeper in the rib than sheep from other States, and should lend itself admirably to crossing with the longwools for the export fat-lamb trade, which is as yet in its infancy so far as South Australia is concerned.

"Wheat is, of course, by far the biggest export commodity in South Australia; the acreage sown is usually about 4,000,000 acres, but the average yield is round about 9 bushels per acre, some of it having a big struggle to make much headway on a 6 in. rainfall. Wool comes next, and then grapes. The wine industry means quite a lot to South Australia. Picking the grapes is, of course, a seasonal occupation and draws crowds of pickers out from Adelaide each season. The vineyards look very well cared for and appear to be carrying an unusually heavy crop this year. Grapes are worth between £5 and £8 per ton, according to quality. The wine trade is mostly in the cheaper grades, such as

hocks and ports for the English market; the long sea trip aids maturing considerably.

"We spent two very interesting days at Roseworthy College (the equivalent of the New Zealand Lincoln), and then a few days at Murray Bridge, on the irrigation area, where we New Zealand boys were thrilled to see our own certified rye-grass, Akaroa cocksfoot, and selected white clover growing as well as anything we had seen in our own country. The manager of Woods Point Station, over which we were conducted, stated that he sows nearly all his irrigated pastures with such a mixture.

"Adelaide is a very pretty city, built on a rigid town-planning system, and is the nearest approach to Christchurch that I have seen. The population of South Australia is 500,000, 300,000 of whom live in Adelaide."

From correspondence with Mr. Whatman and with Mr. Simmons (Hon. Secretary, Junior Farmers' Clubs of New South Wales), there appears to be a likelihood of the four Y.F.C. members from Great Britain coming to New Zealand with our lads on their return, and spending a week or two before leaving for the Homeland. If this eventuates, it is certain that the British lads will be made very welcome.

The following has been received from Mr. Archie Cowan, a member of the New Zealand team on board the s.s. "Strathmore," *en route* from Adelaide to Sydney:—

"I am writing you a short article on what, to my way of thinking, was the highlight of our South Australian tour. We had many educational and many scenic tours, but to me our trip to Murray Bridge, and especially to Mr. Morphett's farm at Woods Point, will be well remembered. We have had a wonderful trip all through. The four British boys are the finest lot it has ever been my privilege to meet, and as we all get on well together the success of the tour is assured."

Dominion President's Tour.

A VISIT was made at the beginning of the month by M. W. F McLaren (Dominion President), accompanied by the Organizing Secretary, to the North Auckland district, for the purpose of investigating the progress of the Y.F.C. movement and furthering the work of organizing in the various localities. Meetings were held at Marehemo, Broadwood, Kaitaia, Oruru, and Whangarei. The visitors were conducted around the respective districts by the departmental officers directly concerned with the work of Y.F.C. organization, Messrs. E. B. Glanville (Whangarei), E. H. Arnold (Dargaville), and E. Moss (Kaitaia). The meetings were well attended, and it is felt that good progress will be made in the formation of clubs throughout North Auckland. The Whangarei A. and P. Association is particularly interested, and is doing all it can to foster the Y.F.C. movement.

Rally at Te Puke.

A WELL-ATTENDED gathering arranged by Mr. C. Walker, Department of Agriculture, Tauranga, was held on the evening of 8th March at Te Puke. Members of the Bay of Plenty clubs met to hear an address by the Organizing Secretary, Mr. S. Freeman, on the development of the Y.F.C. movement throughout the Dominion. Fully eighty young men from all parts of the Bay of Plenty were present. Subsequent to the address a meeting of the District Committee was held, and the proposed tour of the South Island by a party of Bay of Plenty members was fully discussed. The gathering adjourned to supper, which was very thoughtfully provided by members of the Te Puke and Paengaroa clubs; Mr. C. McCracken, Edgecumbe Y.F.C., expressed the visiting members' appreciation to their hosts, and Mr. Walter, Paengaroa Y.F.C., responded.

Bay of Plenty Debating Contest.

A VERY interesting debating contest has been arranged by the Bay of Plenty Y.F.C. District Committee. A challenge shield has been purchased, the various clubs contributing to its cost. The debates are between teams from each club, and the contest is conducted on the "knock-out" system. Each team consists of four speakers; the leaders are allowed ten minutes for speaking and five minutes to sum up, the other speakers being allowed seven minutes each. The first round was held in February, the second round will be held about the middle of this month, and the final round at the end of the month. Two judges have been appointed by the District Executive Committee.

The subject selected for debate in the first round was "That Tours of other Districts are of greater Educational Value than Organized Farm Schools." The draw for the first round was as follows (winning team given first in each case): Katikati (affirmative) *v.* Tauranga (negative) at Tauranga; Te Puke (affirmative) *v.* Paengaroa (negative) at Te Puke; Edgecumbe (negative) *v.* Taneatua (affirmative) at Taneatua; Waimana (affirmative) *v.* Opotiki (negative) at Waimana.

The subject for debate in the second round will be "That a Combination of Cropping and Pastures is more Profitable than All-grass Farming." The draw for the second round is as follows: Te Puke (affirmative) *v.* Katikati (negative) at Katikati; Waimana (affirmative) *v.* Edgecumbe (negative) at Edgecumbe.

The subject chosen for the final debate is "That Stock-disease Control is of greater Economic Importance than the Breeding of High-producing Strains of Dairy Stock."

The debates in the first round created a great deal of local interest, many members of the farming community attending to hear the views expressed by the contestants. All the debates resulted in close finishes, and the excellent standard of debating was commented upon by the judges.

Y.F.C. Tours.

A NUMBER of very interesting and useful tours have been planned to take place during the autumn and winter. The first of these tours is being undertaken by a party of fifty Taranaki Y.F.C. members. The party will leave Hawera on Saturday, 19th March, proceeding by rail to Wellington, and from there by ferry steamer to Lyttelton. Twelve days will be spent in touring the South Island, the party travelling as far as Invercargill and journeying through Central Otago on the return. A complete itinerary of visits to farms and places of general interest has been arranged by the Y.F.C. District Committees in all localities through which the party will travel, and local club members will have the opportunity of making the acquaintance of the tourists at various functions and entertainments that are being held in their honour. Transport in the South Island will be by motor-bus.

A somewhat similar tour of the South Island will be undertaken by a party of Bay of Plenty members, probably during May. Central Otago members are also journeying to South Canterbury during April.

The Wairarapa District Committee is planning a tour of the Waikato and Bay of Plenty districts, and the Manawatu District Committee is contemplating a very comprehensive tour of the Hawke's Bay, Poverty Bay, Bay of Plenty, and Waikato districts. A number of tours on a smaller scale are also being arranged by clubs in other districts.

Y.F.C. Scholarships.

THE following are the awards in connection with the scholarships to Lincoln College available for South Island Y.F.C. members :—

Lincoln College Old Boys' Scholarship, 1938.—John Alan Ballingall, Palmerston South, a son of Mr. J. A. Ballingall, a well-known farmer in the Palmerston district. He is twenty-five years of age and is one of the original members of the Palmerston Y.F.C., the first club to be formed in New Zealand. Since its inception he has been one of its most conscientious members, and has represented his club on numerous occasions. He has held the position of Secretary for one year and has been Chairman during the past two years. He is a member of the local District Committee and also of the South Island Council.

International Harvester Co.'s Scholarship, 1938.—Ivan G. Hurst, Waihaorunga, South Canterbury, a son of Mr. G. C. Hurst, Pentland Hills, Waimate. He is twenty-one years of age. Since leaving the Timaru Boys' High School some four years ago he has been working on his father's sheep-farm. He is a member of the Waihaorunga Y.F.C., one of the most active clubs in South Canterbury, and has held the position of Secretary (two years), Vice-Chairman, and Chairman. He is a keen debater, and has represented his club on numerous occasions. He has also taken an active interest in the local Tennis Club and W.E.A.

Southland Frozen Meat Co.'s Scholarship, 1938 (two scholarships, which are open to Southland Y.F.C. members only). —Arthur S. Trotter, Woodlands, a son of Mr. J. D. Trotter, Woodlands. He is twenty-three years of age, and since leaving the Southland Boys' High School some years ago has had five years' farming experience in Southland. He is a member of the Woodlands Y.F.C., and has been Secretary and Treasurer for the past two years. He has taken a keen interest in the Woodlands Literary and Debating Club.

James A. Hunter, Gore, a son of Mr. J. Hunter, Gore. He is twenty-two years of age, and was educated at the Southland, Gore, and Timaru High Schools ; during the past two years he has been gaining farming experience in the Otama district. He is a member of the Otama Y.F.C., and has taken an active interest in the club's affairs since its inception.

The Selection Committee, Messrs. A. E. Cameron (Chairman, South Island Council), Mr. J. M. Smith (Fields Superintendent, Department of Agriculture), and Mr. Alan Grant (Vice-Chairman, South Island Council), reports that the entries included some of exceptional merit. A number of very promising lads were passed over because they had just left secondary schools. The Committee considered that it was advisable for those awarded scholarships to have had some years of practical farming experience before going to Lincoln College, and also that they should have proved themselves as keen club members. The Committee is of the opinion that the lads selected will prove their worth and be a credit to the Y.F.C. movement.

N.Z. Refrigerating Co.'s Scholarship, 1938.—Awarded to Herbert A. Duff, Edievale (2nd year) and Lawrence J. Mercer, Dunsandel (2nd year). Excellent reports were received on the first year's work of both these lads at Lincoln College, and as a result the N.Z. Refrigerating Co. has generously agreed to renew the scholarships for a further year.

Among the Clubs: Reports on Activities.

MANY South Island clubs being still in recess owing to seasonal work, very few reports are at present to hand from that source ; clubs will be starting in earnest again this month. North Island clubs generally are more fortunate, in not finding it necessary to close down for so long a period.

Otago and Southland.

Arrowtown.—Lantern lecture on " Foot and Mouth Disease," by Mr. C. V. Dayus, M.R.C.V.S. (District Superintendent, Department of Agriculture).

Clinton.—Paper read by R. Roy (a club member) on " Tree-planting."

Lawrence.—Address on " The Otago Harbour," by Mr. R. S. Thompson.

Moa Flat.—Address on " The Rearing of Fat Lambs," by Mr. J. Brown.

Palmerston.—Lecture on " The Alimentary Tract," by Mr. S. R. Craig, Stock Inspector.

Woodlands.—Short talk by M. Clark (a club member) on " The Stock-judging Competitions at the Royal Show in November " ; interesting papers were read by two other club members.

Manawatu.

Apiti.—Address by Mr. L. J. Wild, Principal of the Feilding Agricultural High School, on his recent trip abroad.

Halcombe.—Lecture on " Dips and Dipping," by Mr. G. S. Robinson, Department of Agriculture.

Kairanga.—Remits for Annual Meeting ; suggestions for year's programme. Lecture by Mr. G. S. Robinson, " Dips and Dipping."

Otaki - Te Horo.—Discussion *re* combined club picnic and dance. Address by Mr. C. F. Atmore, LL.M., on " The Purchase of Land in the Olden Days and the Present."

Pohangina Valley.—Lecture on " Hill-country Management," by Mr. E. W. Barnett, of Halcombe. At the previous meeting a lantern lecture was given by Mr. A. J. Galpin, Department of Agriculture, the subject being " Subterranean Clover."

Rangiwahia.—Lecture on " Dips and Dipping," by Mr. G. S. Robinson, Department of Agriculture. Arrangements *re* Jersey Calf Judging Competition at the Rangiwahia A. and P. Show.

Woodville.—Discussion on district activities ; arrangements for club field-day ; committee appointed to go into the matter of a proposed tour.

Wairarapa.

Ballance. — Committee appointed to meet Mangatainoka Club *re* arrangements for annual combined field-day. Lecture on " Diseases in Sheep," by Mr. E. E. Elphick, M.R.C.V.S., Government Veterinarian.

Carterton. — Report on dance held recently to " farewell " club members touring Australia. Address by Mr. J. F. Thompson on " Four Thousand Miles on a Schooner in the Tropics."

Mangatainoka. — Arrangements made for club members to assist as stewards at the Pahiatua A. and P. Show. Talk by Mr. Heckler on " What to Look for when Purchasing a Farm " ; talk by Mr. Cotter on " Grasses, and the Eradication of Fern."

Martinborough.—Discussion *re* the holding of a Fat-lamb Judging Competition at the Horse Sports, 23rd March. Lecture and demonstration by Mr. J. Scott on " Drafting Fat Lambs."

Wanganui.

Bulls.—Screening of a film dealing with " The Working of Caterpillar Tractors," by a representative of Messrs. Gough, Gough, and Hamer.

Taihape.—Field-day on Mr. G. Durrant's property, " Matukui." Demonstration of Romney ewes and rams, by Mr. A. Swift. A total attendance of thirty-seven.

Taranaki.

Alton.—Discussion *re* district tour of South Island. Arrangements for annual sports, picnic, and dance. Lecture by Mr. J. B. Sawers, Department of Agriculture, on "Modern Dairy Sheds," and "Cleaning the Milking-plant."

Cardiff.—Arrangements for club field-day. Lecture by Mr. A. G. Elliott, Department of Agriculture, on "The Importance of Proper Farm Management."

Pukengahu.—Finalizing of arrangements for club ball. Discussion *re* South Island tour. Lecture by Mr. Pettigrew on "Farm Plantations." At the previous meeting Mr. E. H. Stephens, M.R.C.V.S., Government Veterinarian, gave a lecture on "Clean Milk."

Waverley.—Business meeting. Discussion on South Island tour; Sheep and Cattle Judging Competitions at the Waverley A. and P. Show; decided to invite the Whenuakura Club to compete also. Ten members offered their services as stewards at the A. and P. Show. Proposed that a debate be held at the next meeting, and later against the Whenuakura Club.

Whenuakura.—Lecture on "First Aid," by Dr. W. T. Simmons.

Hawke's Bay.

Dannevirke.—Business discussion. Question evening. Short talk by Mr. H. S. M. Quigley, Farmers' Union Secretary.

Meeanee.—Messrs. R. Powdrell and W. Brownlie, Chairman and Secretary, respectively, of the Wairoa Club, gave addresses on club work and activities, relating their own experiences in regard to the management and general running of a Young Farmers' Club. Some very valuable and helpful advice was given by both speakers, who had journeyed between seventy and eighty miles to attend the meeting. The Wairoa Y.F.C. is at present the strongest club in the Dominion, having a roll-call of over ninety members. Mr. S. Freeman, the Organizing Secretary, was also present, and addressed the meeting on "The Foundation, Growth, and Benefits of the Y.F.C. Movement." The Meeanee Club was formed last December, and has already a membership of twenty-six young farmers.

Norsewood.—Discussion regarding subscriptions to the *Journal of Agriculture*; all present, with but one exception, became subscribers. Mr. R. J. Macdonald, of Dannevirke, gave a very instructive address on "The Training of a Sheep-dog." Mr. Macdonald has been of great assistance to Y.F.C. members, and has on a number of occasions given talks and demonstrations.

Onga Onga.—An interesting field-day, with an attendance of thirty-two, was held on Mrs. Robottom's property, Argyll. Those present were addressed by Mr. A. Robottom and Mr. J. W. Palmer (Department of Agriculture), and the following demonstrations were given: "Romney Rams and Ewes" (Mr. A. Robottom); "Southdown Rams and Ewes" (Mr. A. Robottom); "Lucerne Establishment and Management" (Mr. J. W. Palmer); "Ensilage and Young Grass" (Mr. J. W. Palmer). At the conclusion of the demonstrations afternoon tea was served by Mrs. and Miss Robottom. A week previously a field-day was held on Mr. Buchanan's property at Onga Onga, and took the form of a judging competition. Judging points were explained by Mr. Wallace Todd, Otane, after which the members present judged the pen of three sheep. Mr. Todd then gave a demonstration, which was followed by afternoon tea provided by Mr. Buchanan.

Poverty Bay.

Gisborne.—Addresses by club members as follows: "Stack-building" (G. K. Cooper), and "Dipping" (R. W. Smith); the speakers were asked numerous questions, and general discussion ensued.

Nuhaka.—Lecture by Mr. R. E. R. Grimmett, Chief Agricultural Chemist, Wellington, on "The Structure of Pasture Plants." Mr. R. P. Hill, Fields Instructor, Department of Agriculture, and Mr. P. Haugh, Government Veterinarian, were also present.

Te Karaka.—Address by Mr. H. F. Forster on "Farm Insurance."

Tolaga Bay.—Travel talk by Mr. E. Robinson.

Bay of Plenty.

Edgecumbe.—Business meeting. Messrs. L. Patchell, F. C. Briggs, C. A. McCracken, and G. Murray elected to represent the club in a debating contest with Taneatua Y.F.C. Decided that all financial members become subscribers to the *Journal of Agriculture*. Club Chairman nominated as a member of the N.Z. Grasslands Association. Five members volunteered to assist the Judges at the local A. and P. Show.

Katikati.—Preliminary debate in preparation for the District Debating Competition; the subject for the debate was "That Organized Tours of other Districts are of Greater Educational Value than Farm Schools." The debate was won by the negative, by 72½ points to 63.

Opotiki.—Lecture by Mr. F. J. Short on "Points to Look for when Buying Horses, and Common Ailments in Horses, and their Remedies." Arrangements were finalized in connection with a club dance, a cricket match with Waimana Y.F.C., and a debate with Waimana Y.F.C.

Paengaroa.—Discussion *re* dance, field-day, and an invitation from Tauranga Y.F.C. to join them in a picnic. A practice debate was held in preparation for the District Debating Competition.

Te Kuiti.

Aria.—Special meeting held on the occasion of a visit by Mr. J. P. Duncan, Wool Expert, Department of Agriculture. Mr. Duncan gave a very instructive lantern lecture and demonstration on "Wool." At the ordinary club meeting later in the month arrangements were made for the purchase of a benzol outfit (for testing wool). Mr. W. Stalker addressed the meeting on "Farming Methods in Southland."

Otorohanga.—Special meeting; lantern lecture and demonstration by Mr. J. P. Duncan, Government Wool Expert, on "Wool." Business meeting later in month. Two field-days were also held on Mr. E. L. Strawbridge's property, Kio Kio, Mr. Strawbridge demonstrating on Romney sheep; and on Mr. Sanderson's property, Mr. Sanderson demonstrating on a Jersey cow and Mr. R. Davis on a baconer pig.

A stock-judging competition, for a Challenge Cup and miniature donated by Mr. H. H. Evans, was held at the local A. and P. Show. There were twenty-seven competitors, including ten from the Te Anga Club. The results were as follows: 1st, R. Milne (Te Anga Y.F.C.); 2nd, H. Murphy (Otorohanga Y.F.C.); O. Gordon (Te Anga) and J. Evans (Otorohanga) tied for third place.

Te Anga.—Lantern lecture and demonstration on "Wool," by Mr. J. P. Duncan, Government Wool Expert. A field-day was held on Mr. D. Tynan's property—Mr. Sanderson, of Otorohanga, demonstrated on Jersey cows and baconer pigs, and Mr. Tynan demonstrated on Romney rams.

Rotorua.

Ngakuru.—Lantern lecture by Mr. H. Woodyear-Smith on "The Manufacture of Superphosphate." A successful field-day was held on Mr. Morey's property, there being an attendance of twenty.

The demonstrations, &c., were as follows: "Pigs and Bloat" (Mr. Mullins); "The Mower and Hay-stacking" (Mr. Martin); "The Milking-plant" (Mr. Leask, Dairy Inspector). This club has only been in operation since last November, and has already a membership of twenty-six.

Putaruru.—Business meeting; arrangements made for hay, ensilage, and swede competitions; forms in connection with these were drawn up.

Auckland.

Mangatawhiri.—General business. An interesting talk was given by A. Chipman (a club member) on "The Budding and Grafting of Fruit-trees."

Impressions of a South Australian Farm.

A. Cowan (Apiti Club), a Member of the New Zealand Team touring Australia

I CONSIDER the visit to the farm of Mr. Morphett, Woods Point, Murray Bridge, to be one of the highlights of our tour of South Australia. I will say very little of that part of the property comprising some 12,000 acres of hill country, but will endeavour to give some idea of an area of 600 acres on one side of the river and 270 acres on the other.

This farm of 870 acres, apart from a high flood about every ten to fifteen years, and a rainfall of 11 in., gets its moisture from the Murray River by means of irrigation. This is carried out by very simple but well thought out methods.

The water-level of the river is about 1 ft. above the level of the land, and when in flood or when there is a strong south-east wind it is much higher. The banks are built up about 10 ft. to 15 ft., and the water is siphoned out from the river into a main drain. From there the water is run into lesser drains going at right angles to the main drain and also the river. As the water passes down the drains it is blocked at intervals and the water floods out over the ground. It takes some eighteen hours to flood a 21 acre paddock, and this is done to each paddock immediately after it has been fed off, and again eight days before feeding. As soon as the whole paddock is flooded the drains are unblocked and the water flows into a large drain at the bottom of the paddock. It should be stated that the far end of the paddock from the river is from 2 ft. to 5 ft. lower than the ground at the river end, so that the water gravitates to the last drain. Here it flows to a big pumping-shed, where an 80 h.p. Kynoch charcoal-gas burning engine drives a 400,000 gallons per hour centrifugal pump, which returns the water to the river. As this is going on very nearly day and night, some idea of the amount of water used can be realized.

The grass mixture used for sowing down on this area is as follows :—

	Pounds per Acre.
Certified New Zealand rye-grass	10
Certified Akaroa cocksfoot	10
Certified New Zealand white clover	2
Strawberry clover ..	0½
Red clover	2
Italian rye-grass ..	6
Prairie grass	8
Meadow foxtail ..	2
Total	40½

This mixture appears to grow to absolute perfection. The New Zealand certified grasses and clover have a wonderful hold, and are undoubtedly the three best pasture constituents, with prairie grass running them very close. The pastures were absolutely amazing. It is all spring sowing, and areas sown down this spring do not show a single bare patch, and are growing an enormous quantity of feed.

They do not believe in keeping the grass short here. It is allowed to grow from 8 in. to 18 in. high before grazing : there is such a high percentage of protein in the young grass that it scours the sheep, whereas the longer grass contains more carbohydrates and fibre.

Rotational grazing is practised, and the rotation followed on the 270-acre section is as follows : The main part is subdivided into twenty-two paddocks, and this is grazed by two mobs of sheep, each using eleven paddocks. They are kept on each paddock for three days, thus taking a month to complete the rotation. The sheep are gone round each day, and any with lame feet or "cloudy eye" are taken out and treated. The whole mob is put through a 4 per cent. formalin foot-bath every three weeks. The sheep are all drenched when purchased, again eight days later, and then every three weeks, the drench used being copper-sulphate (bluestone) and nicotine-sulphate.

The two mobs of sheep contained two thousand seven hundred in each, and were bought in at an average cost of 18s. 4d. It is estimated that by the end of April, when selling commences, they will be worth 34s. for the crossbred wethers and 26s. for the merinos.

The peak month for production is February, and at present the stock carried comprises twenty-two sheep per acre. However, it is necessary to sell all except three thousand breeding-ewes and any cull wethers by the end of May. The average carrying-capacity is sixteen sheep per acre. About fourteen thousand sheep are sold each year.

A flock of three thousand ewes is maintained, and the lambing is usually about 112 per cent., with a 5-per-cent. loss after docking. The ewes are a very mixed lot, and the rams used are all Border Leicester. Tupping commences at the end of April and lambing begins in late September. We were told that when the lambs were sold in April and May they would kill at the average weight of 60 lb. per head. According, however, to New Zealand standards they appear to be a very poor class of lamb, and at the present time I consider that it would be very difficult to pick out fifty prime lambs that would kill out at 36 lb.

The outstanding feature of the farm is the importance of the New Zealand grasses in the pastures, and I feel sure that with the certified rye-grass, cocksfoot, and white clover, plus prairie grass, they have the finest pastures in the Southern Hemisphere.

Contributions to *Journal.*

CLUBS and club members are reminded that their own contributions are necessary in order that this section may be of service and value to the Y.F.C. organization generally. Articles on matters connected with farming, accompanied by photographs, are invited ; correspondence on club matters, suggestions regarding these pages, and ideas for the better running of all club activities will also be welcomed.

It has also been suggested that a page be devoted monthly to letters from members containing their ideas and observations on various matters of interest to all members. Should this prove popular, the best two or three of these letters can be published in this section each month. In order to "set the ball rolling," members are invited to send in short letters for publication in the next issue on the particular subject that they consider will be of most interest. A selection will be made of these letters, and the correspondence can be carried on monthly until the various subjects have been thoroughly ventilated.

Correspondence should be clearly written, and addressed to—

The Organizing Secretary,
Young Farmers' Clubs,
C/o Department of Agriculture,
Private Bag, Wellington.

District Pig Councils.

THE Director-General of Agriculture has approved of the appointment of the following officers of the Department as departmental representatives on the executive of District Pig Councils : Messrs. J. G. Niccol, Pukekohe ; G. X. Kent, Whakatane ; J. F. Sheppherd, Hamilton ; H. R. Denize, Palmerston North ; J. M. Ferriday, New Plymouth ; B. Grant, Christchurch ; C. V. Dayus, Dunedin.

Health Notes for the Farm.

Contributed by the Department of Health.

Mosquitoes and Mosquito Control.

Which Crop do You raise?

The mosquito is a grey bug and has six legs, a bright eye, a fine bust, a sharp tooth, and a ready wit. He doesn't waste any time hunting up his customers, and always lights on a baby first if there is one on the premises.
—Josh. Billings.

As the extermination of mosquitoes adds to the sum of human happiness, this subject is one of public health importance. Mosquitoes inhabit every country from the barren polar circle to the coral strands of India. This frail, tiny, and unusually beautiful insect has proved one of the scourges of civilization, as one writes "a flick of the finger will kill it, yet this frail winged insect has performed astonishing feats. It has vanquished men, swept aside civilizations, and blotted them out; it has effectually stemmed the tide of human progress."

Work of Ronald Ross.

It was in 1897 that Dr. Ronald Ross achieved the honour of discovering the malaria parasite in the body of a mosquito, thus verifying Dr. Patrick Manson's predictions, who discovered in China that the mosquito was the carrier of a tropical disease very common there. Ross, who was also a poet, novelist, artist, and a musician, wrote at the time of this discovery which was to prove of such incalculable benefit to the human race :—

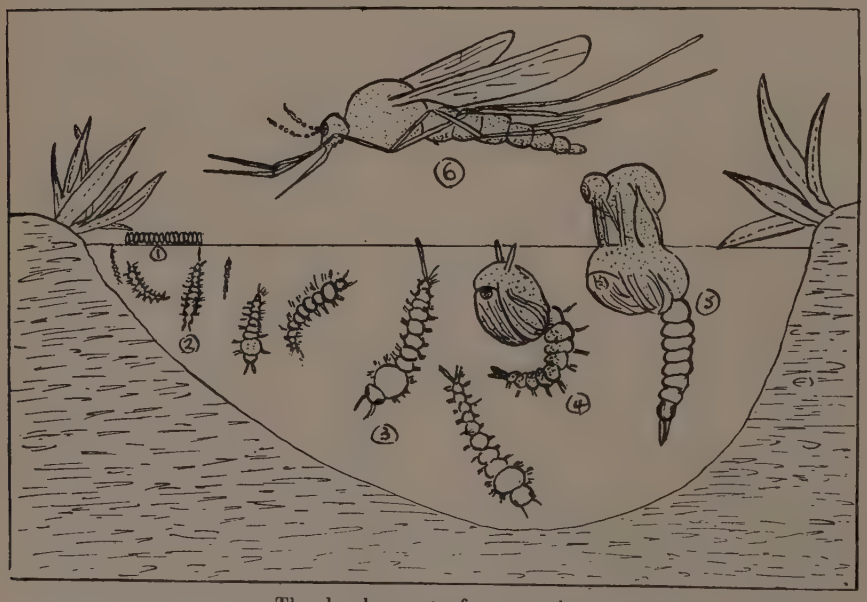
This day relenting God
Hath placed within my hand
A wondrous thing, and God be
praised. At His command
Seeking His secret deeds
With tears and toiling breath,
I find thy cunning seeds
O million murderous Death;
I know this little thing
A myriad men will save.
O Death, where is thy sting?
Thy Victory, O Grave.
Before thy feet I fall,
Lord, Who made high my fate,
For in the mighty small
Is shown the mighty great.

Thirty-six years later a tablet was placed in the cottage at Secunderbad, India, in which Ronald Ross had sweated with heat. It has on it the following inscription :—

To the memory of Sir Ronald Ross and the discovery he made here on August 20th, 1897, that the anopheles mosquito is the carrier of the malaria parasite.

In 1902 Ross received the Nobel prize in Stockholm. He died in 1932.

When a mosquito bites or saws a hole through the skin she injects into the victim a fluid from her salivary glands through a tube-like arrangement somewhat like a hypodermic needle. In this fluid are sometimes the organisms which produce malaria and yellow fever. New Zealand is fortunate that such diseases do not occur here, as the particular types of mosquitoes which convey them have not so far been shown to exist in the Dominion. However, the reduction of mosquitoes in badly affected areas will reduce the likelihood of disease-carrying forms becoming established. Also mosquitoes are always a nuisance, and the annoyance they cause is in itself sufficient reason for measures towards their suppression.



The development of a mosquito.
(1) Eggs; (2) hatching larvæ; (3) grown larvæ, or wigglers; (4) pupa; (5) adult emerging from pupa; (6) flying away.

Habits of Mosquitoes.

It is only the female that bites, for the male mosquito sucks the nectar of flowers and the like. Quite a number of insects such as gnats or midges are incorrectly called mosquitoes. Some of these will bite when the occasion offers. William Cullen Bryant, in his poem to a mosquito, rhymes :—

Fair insect, that with threadlike legs spread out,
And blood extracting bill and filmy wing,
Do'st murmur, as thou slowly sail'st about,
In pitiless ears, full many a plaintive thing,
And tell how little our large veins would bleed,
Would we but yield them to thy bitter need.

After appealing to the mosquito to leave alone "a brother poet gaunt like thee," he continues :—

Try some plump alderman, and suck the blood
Enriched by generous wine and costly meat,
On well-filled skins sleek as thy native mud,
Fix thy light pump and press thy freckled feet,
Go to the men for whom in ocean's halls,
The oyster breeds, and the green turtle sprawls,
And when the hour of sleep its quiet brings,
No angry hands shall rise to brush thy wings.

Shipley informs us "that there has always been some difference of opinion as to how the buzzing sound is produced. Unlike human beings, the male at all times emits a higher-pitched note than the female, and in both sexes the note rises after feeding. The greater the meal the higher the note. This is, however, by no means confined to mosquitoes. It is a matter which any one must have noticed when assisting at a public dinner or when dining in a college hall!" The same investigator found that mosquitoes appear to be attracted by dark colours such as navy blue, dark red, scarlet, black, slate-grey, and in a much lesser extent by pale green and light blue; ochre, orange, and yellow, especially the last two colours, seem positively to repel the insect.

The beautiful transparent wings of the mosquito are beset with minute spikes which serve to break up the light and to give rise to the many-coloured iridescence of the creature's wings. The posterior border of the wing bears rows of beautifully graded scales. These add much to the symmetry and beauty of the whole structure.

The insect usually rests upon four out of six legs, in which case the hinder pair are held out and curved upwards. The hind legs not infrequently serve as a test for food, as when alighting upon sweetened milk or fruit, the moment the hind leg touches the fluid or juice the insect will wheel round and at once begin to feed.

Control of Breeding-places.

The control of the mosquito is largely the control of breeding-places. That man can be successful in his campaign against an elusive enemy like the mosquito is proved by the results which have attended the campaigns in the Isthmus of Panama, Havana, India, and other countries. The attempt of the French to cut the Canal was foiled, said the *London Times*, "chiefly by the mosquitoes of intermittent fever and yellow fever, and cost some fifty thousand lives." The best results are obtained by communal efforts, directed by persons who have some real knowledge of mosquitoes and their habits, but individual efforts are of great importance. Their presence in the house is usually good evidence that they are breeding in some place near the house; in general they do not fly far, and are usually bred in the neighbourhood where they are found. However, there are some species which migrate inland from salt marshes for a distance of some miles. The breeding-places are water, especially stagnant water, ponds, marshes, pools, puddles, empty tins, bottles, vases, and the like; uncovered cisterns or water-tanks, defective roof-gutters, and slowly running streams.

They never breed in damp grass, weeds, or bushes, as is popularly supposed, but the winged insects frequently rest and hide in vegetation. They usually lay their eggs on the surface of the water, and these, depending upon the species, either float separately on their sides, or adhere together in irregular, raft-like masses. In a day or two under ordinary circumstances the eggs hatch out into larvæ or wiggle tails. It remains in this stage for a few days and is then transformed into a curiously shaped creature known as the pupa, which remains on the surface. This stage lasts two or three days or more, and is terminated by the emergence of the adult winged insect. The time from the laying of the egg to the winged insect may be as short as nine days.

Kerosene Spraying.

As regards the treatment of breeding-places, drain or fill up small pools and marshes; bury empty tins and the like. Kerosene sprayed on water kills the little wriggling mosquito larvæ. The water must be covered with a complete layer of oil—two tablespoons should be used to cover each fifteen square feet of surface, as the kerosene soon evaporates in summer. The oiling should be repeated at intervals; a good spray mixture is kerosene 60 parts, fuel oil 40 parts; the addition of a little castor oil to the kerosene gives a better film. Slow-moving streams should be cleared of weeds, which form admirable shelter for larvæ and pupæ.

Ornamental ponds should be stocked with minnows or goldfish as they are the natural enemies of the larvæ.

If you are troubled with these pests in the home, one morning in each week go carefully through the house and see that all flower vases, water-jugs, or any receptacles of water are emptied and cleansed. Net all openings of water-tanks to prevent access of mosquitoes. Wire gauze or cheese-cloth with a mesh not bigger than 18 threads to the inch stops mosquitoes getting in or out of a cistern or other receptacle of water.

American Slogan.

The Americans sum up their campaign against mosquitoes thus: "a slap at the mosquito, for the moment; oiling for the week, ditching for a season, but reclamation for all time." Remember the slogan "No water, no mosquitoes." Scratching the bites of mosquitoes or sandflies may lead to sores. Do not scratch, but apply a weak solution of ammonia, tincture of iodine, or Friar's Balsam.

To quote again from the entertaining writings of that cute observer of mankind's foibles and afflictions, Josh Billings: "The mosquito is a short-lived bug, but doesn't waste any time. They are always ready for business and can bite ten minutes after they are born just as fluently as ever. The mosquito is a social insect. They live very thick amongst each other and love the society of man also, but don't contract any of his vices. The mosquito is a child of circumstance in one respect—he can be born, or not, and live and die a square death in a lonesome marsh sixteen hundred miles from the nearest neighbour without ever tasting blood and be happy all the time; or he can get into somebody's bedroom through the keyhole and take his rations regularly and sing psalms of praise and glorification. It doesn't cost a mosquito much for his board in this world. In the dark, still night, when everything is as noiseless as a pair of empty slippers, to hear one at the further end of the room, slowly but surely working his way up to you, singing the same old sissing tune of theirs and harking to feeling the exact spot on your face where they intend to locate, is simply premeditated sorrow to me; I had rather look forward to the time when an elephant was going to step on me. This life is full of pesky mosquitoes who are always looking for a job, always ready to stick a thistle into you somewhere, and sing while they are doing it."

If we cannot lessen or altogether avoid mosquitoes of the human species, we can at least endeavour to exterminate their brethren of the insect world to safeguard health and so increase the sum of human happiness. Any village, country-side, or city that can claim it is free from these pests soon becomes an ideal place for tourists and those seeking summer homes or permanent places of abode. In a kitchen garden enough of the ordinary vegetables can be raised to supply a family. In the same area empty cans and bottles can hold sufficient water to breed a supply of mosquitoes for the entire neighbourhood. It is no more than a fair question—Which do you raise?

Safer Homes.

ACCIDENTS now make up one of the leading causes of suffering and death. A definite campaign is being waged against accidents in industry and on the roads. However, attention might be drawn to the prevalence of accidents in the home, a large percentage of which affect young children and aged persons. This is natural, because they are the ones most likely to have accidents and since they are at home most of the time. Some accidents are unavoidable, but most of those at home can be prevented by simple and inexpensive methods.

Stitches in Time.

Stairways should be well lighted and equipped with handrails. Steps should be kept clear of rubbish and other things. Never stand on rocking-chairs or rickety ladders. Be especially careful about slipping in the bath tub. Falls make up almost half of all home accidents.

Label poisons and put them in bottles of special colour or shape. Better keep them locked up, if children are in the home. Never take medicine in the dark.

Dispose carefully of broken glass, open tin cans, and used safety-razor blades. Round-end scissors are best for children's use. Beware of can-openers and sharp knives. Small and dangerous things, like pins, frequently find their way into babies' throats from no other cause than carelessness.

When the kitchen windows are open, keep an eye on the gas flames—a gust of wind may blow them out. A pot boiling over can do the same thing.

High polish on the floors looks nice, but may be dangerous, especially for old people.

Keep your electric fixtures in good repair. See that they are installed and repaired by experts. Hands off when your body is wet. Examining a faulty electric fixture while standing in a bath tub is dangerous.

Explosive fluids for cleaning or fuel should be kept outside the house. Do not "dry clean" clothing in an unventilated room.

Matches and children make a dangerous combination. Keep them apart.

Cuts and scratches should receive immediate attention. Use iodine or some other reliable antiseptic. If infection sets in, see your doctor.

Founders of Modern Agriculture.

J. W. Woodcock, Fields Division.

Arthur Young (1741–1820) may be regarded as the founder of agricultural journalism. He has been described as the greatest of English agriculturists and the poorest of practical farmers. He was, in fact, a highly successful journalist and the originator of the descriptive agricultural tour which is, even to-day, a popular feature of agricultural periodicals and magazines.

Although farmers as a class are not particularly fond of reading, and are somewhat suspicious of anything savouring of "book learning" as opposed to practical experience, agricultural journalism has played a valuable part in the advancement of agriculture. For, however much we can profit by our own experience, the experiences of others are equally, if not more, valuable, and such testimony is chiefly brought to us by travel or by reading.

Although in his youth Young was apprenticed to a wine-merchant he soon forsook that calling and started a monthly magazine in London. This failed, however, and he returned home to his 20-acre farm. He had no knowledge of farming, and failed to make a success of his first farm. Nothing daunted, he acquired a larger property after marrying a lady of some wealth.

As a practical farmer Young failed time after time, chiefly through carrying out lavish experiments, which he afterwards recorded in a work entitled "A Course of Experimental Agriculture." The simple fact was that whenever he put pen to paper he was successful; whenever he bought a farm he soon became a ruined man and had to turn once more to journalism. His quests for various farms furnished material for works such as "Six Weeks' Tour through the Southern Counties," "The Northern Tour," and "The Tour in Ireland"—very popular works which ran through several editions and which were translated into many languages. The most useful feature of these descriptive tours was the practical information which they gave on the important subject of suitable courses of crops, and there is no doubt that in his travels Young picked up and described many district practices, the merits of which were quickly recognized.

In the year 1784 Young began the publication of the *Annals of Agriculture*, a monthly publication which ran through forty-five volumes, covering the whole field of agriculture. These volumes created quite a stir in European circles, and from all parts of the Continent there flocked scholars to study at the author's feet. Publishers clamoured for his works, his receipts were considerable; yet, still unshaken in his love of the soil, he continued to spend large sums of money on his farms. As with some professional men of our time, "what he gained on the swings he lost on the roundabouts" of farming. Nevertheless, he was responsible for sifting and putting on record much of the available information of his day, and, above all, he was responsible for making agriculture fashionable. As a result the aristocracy paid more attention to their estates and British farming was enriched by the influx of attention from the nobility, who had, up to that time, treated agriculture with contempt.

(To be continued.)

Southern Wheat Crops.

The summer conditions in the South, though too dry for stock, have suited the wheat crop, and some of the finest crops in New Zealand this year will be harvested in southern districts. Hardly without exception they are clean strawed and heavily headed. On the Taieri Plains there are a number of crops of Hunters that will yield fully 60 bushels per acre. Heavy crops of this variety are also to be noted farther South. It may interest Northern growers to know that Hunters is invariably spring sown, mostly in September, in southern districts.

Cross 7 has rapidly come into prominence, and it may be said that it is under a commercial try out. It appears to be yielding well, even in the coastal southern districts.

Unfortunately, a number of very fine crops, some almost perfect in respect of freedom from seed-borne diseases and foreign varieties, have been lost for seed-certification purposes owing to the delay of the Wheat Committee in stating the price to be paid to growers for certified seed-wheat.

—J. O. Wallace, Dunedin.

Grassing of Reclaimed Tidal Flats.

E. B. Glanville, Instructor in Agriculture, Whangarei.

THE period which must elapse from the time the sea-water is shut off until a reclaimed tidal area is ready to be successfully sown to permanent pasture varies considerably with the type of soil and subsoil dealt with. After years of submersion by sea-water the soil becomes saturated with salt. It may take two to ten years or more before the percentage of salt is reduced sufficiently for pasture grass and clovers to establish satisfactorily. While there is a large percentage of sodium salts in the soil the clay types, particularly those with little or no shell near the surface, remain sticky. Ploughing or cultivating them too early may do a great deal of harm, in rendering these types unsuitable for the growth of plants other than rushes and sedges.

All types overlying shell beds are easily dealt with, and may be made ready by thorough drainage to carry permanent grass and clover within two or three years after stop-banking. Sandy loam to sandy clay loam types which crack freely after stop-banking require least drainage and are soon ready for grass. Sands with no shell which do not crack, and sticky clay types which take a considerable time to drain efficiently, are the slowest to come in. A thorough internal underground drainage system working satisfactorily is essential before any attempt can be made to prepare these types for permanent grass.

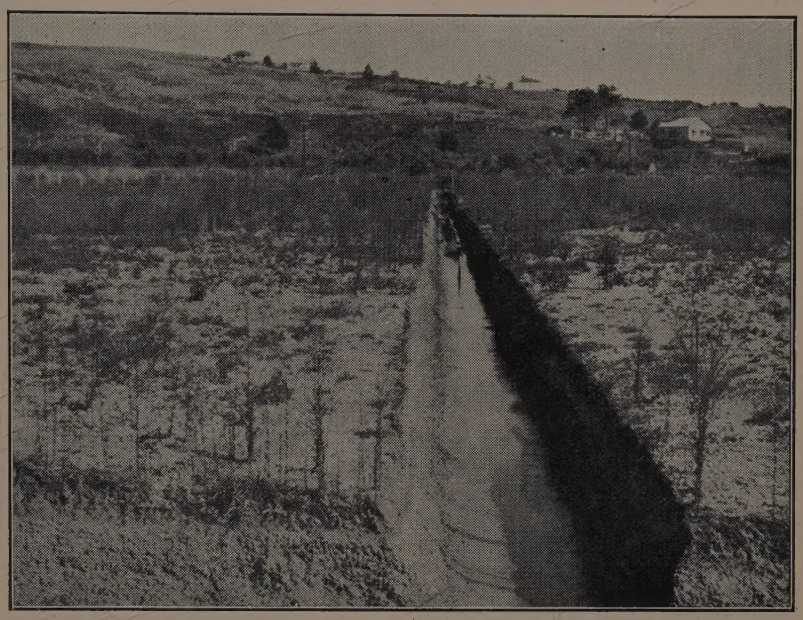


Fig. 1.—Reclaimed tidal flat—open drain in a sandy loam overlying a bed of shell. Drainage becoming effective, as indicated by fleabane (*Erigeron canadensis*) rapidly taking charge.

As the drainage on reclaimed tidal flats begins to take effect and the soil becomes sweeter through the percentage of salt decreasing, two plants commence to establish, known as sea aster (*Aster subulatus*) and fleabane (*Erigeron canadensis*). These plants are known as indicator plants, and act in the capacity of a soil chemist. When they start to come in and grow on reclaimed areas, it is an indication that the soil is becoming sweeter through the salt content diminishing.

Sea aster (*Aster subulatus*) is the first indicator plant which makes its appearance. It is an annual with quite smooth stems and leaves free from hairs. The plant seldom reaches more than 3 ft. in height. The lower leaves may be up to 8 in. long and ¾ in. wide, slightly fleshy and smooth to the touch, becoming thin when dry. The margins of the leaves may be somewhat wavy, but lack distinct teeth. The upper leaves are shorter and very narrow, widest near the bases. The branched inflorescence is more spreading and open than that of fleabane. The flower-heads are purplish in the centre, and the white rays are usually more distinct than in the fleabane. Sea aster will rapidly become general over the reclaimed area as soon as the salt content of the surface soil is slightly reduced. This plant definitely indicates that the salt is commencing to go from the soil, but it is not in a fit condition to prepare for permanent pasture until fleabane (*Erigeron canadensis*) commences growth and begins to replace sea aster.

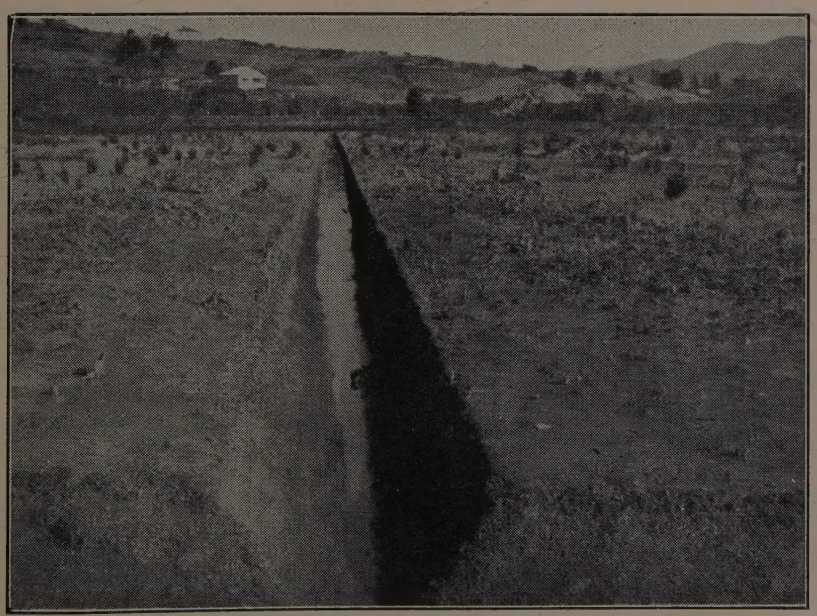


Fig. 2.—Reclaimed tidal flat with clay soil. Open drain dug at same time as Fig. 1. Drainage slow. The indicator plants—sea aster (*Aster subulatus*) and fleabane (*Erigeron canadensis*)—have not commenced to establish.

Fleabane (*Erigeron canadensis*) is an annual, with erect, rather wand-like, finely grooved, bristly, hairy stems. On good soil it may reach a height of 10 ft., but on poor soil may flower when only a few inches high. When cut it stools freely, assuming a bushy habit. The lower leaves are about 3 in. long and up to ¾ in. wide, the widest part being above the middle. They are rough to the touch, owing to the bristle-like hairs, and usually show several distinct, distant teeth along the margins. The upper leaves are much narrower, usually lacking teeth, and produced in abundance. The flower-heads are very small and numerous, more or less clustered on branching stems from among the upper leaves. Small white rays in the flowers can only be seen on very close inspection. Fleabane is often known as horse-weed, butter-weed, fire-weed, bitter-weed, but is generally known as fleabane. It is rejected by stock, and is to be classed as a harmless weed. The leaves are bitter; the plant is objectionable if occurring in any quantity of hay.

On reclaimed areas in the process of sweetening it grows on the higher parts, and does not invade the flats till the salt content has considerably decreased. As the sweetening process proceeds, fleabane comes in first along the edges of drains, on drain banks and stop-banks, and gradually invades the lower areas. Fleabane does not become general until the land is well enough drained and free from salt to take grass well. When the area reclaimed reaches this stage and fleabane has practically taken charge, preparation may commence to sow permanent grass, but it is a mistake to make any attempts at grassing until this stage is reached.

Eradication of Tall Fescue.

C. R. TAYLOR, Instructor in Agriculture Whakatane.

TALL fescue is a grass that, while tolerating a fairly wide range of soil conditions, really delights in situations moist and fertile, such as partially drained swamps or low-lying alluvial soils. Under such conditions it is exceedingly aggressive in growth characteristics, and in consequence it rapidly becomes a serious menace on country suitable for farming purposes. Its eradication involves the employment of several different operations which must all be carried out thoroughly if success is to be assured.

The first essential is proper drainage. This is necessary not only as a measure of considerable discouragement to the growth of fescue-plants, but also to allow of the land being thoroughly cultivated and crops sown as the final stage in the work of eradication. Should timber also be present it will be necessary to attend to its removal before thought can be given the important question of ploughing. In localities favoured with a fair depth of free-working soil the fescue may, after getting rid of as much rank growth as possible by burning or grazing, be deeply ploughed under with a swamp plough or other suitable implement. It is important, however, that all plants be properly turned under, and should any have escaped the plough they should be turned over with a spade.

In districts the soils of which are inclined to be heavy and shallow it is quite useless, in fact often dangerous, to attempt to plough without first of all ridding the land as much as possible of fescue by burning off rank growth and then pulling out plants by such methods as are available on the farm. For this work some farmers find that rotary hoes give satisfactory results, while others use a triangular harrow fitted with knife edges, or even an old road-grader has its uses in this direction. Whatever the method used, however, the principal objective is to strip the soil surface of its fescue covering before commencing to plough.

Preparation of Seed-bed.

Having ploughed the area to be freed from tall fescue, the next operation is the preparation of a really good seed-bed for the sowing-down of a suitable smother crop. Disk and tripod harrows are best used for this work, as it is most undesirable to bring to the surface pieces of fescue-plants, which would happen, of course, if any of the spring-tooth type of cultivators were utilized.

In the choice of a suitable annual smother crop preference should be given to one possessing qualities of quick establishment and rapid, vigorous growth rather than its immediate value as a stock-fodder or other commercial crop. Rape, maize, oats, oats and tares, partridge peas, chou mollier, &c., are all suitable crops from which a selection may be made. Sometimes potatoes are planted, and the intercultivation given to the crop is relied upon to destroy much of the fescue-seedlings and other growth that seeks to re-establish.

Following the smother crop the land may, if reasonably clean, be ploughed again and resown to permanent pasture, but should there be any doubt in the farmer's mind as to the wisdom of doing this it would be better to sow a second annual crop and then to permanently grass the area. In any case, before the second or subsequent ploughings any fescue that has reappeared should be chipped off with hoe or spade. Once down in permanent pasture great care requires to be given to its management, as otherwise it is only a matter of time before the field is overrun with fescue again. The soil's fertility must be maintained at a sufficiently high level to enable the various economic grass and clover species to so develop that they are more than able to hold their place in the sward in competition with extraneous species of low economic value or possessed of dangerous characteristics.

Grazing Management.

Where a soil is unable to naturally provide this essential fertility, assistance must be given to it per medium of one or more of the artificial fertilizers. (District Instructors in Agriculture, &c., will be pleased to advise farmers on correct manurial practices.) Grazing management also requires careful attention at all times, and in this connection practices calculated to thicken up and maintain a tight sward are definitely desirable. On no account should a fescue-freed pasture be shut up for hay for some years subsequent to sowing down, on account of the danger of a few fescue-plants being given the opportunity of seeding and thus causing further trouble. Tall fescue is a most prolific producer of viable seeds, and, in consequence, great care should be exercised to see that fence lines, drains, &c., are kept as clean as possible of seeding fescue and also that stock, too, do not carry seed from an infected area to a clean one.

Ergot Inspection.

Apart from the troublesome nature of tall fescue as what might be termed a weed under certain conditions, it is also a distinct menace to the health of stock owing to its liability to ergot infection—a fungus that attacks the seed-head of the

plant, and in appearance is not unlike a small black horn about ½ in. long. Stock grazing ergot-infested fescue (other grasses —viz., rye and cocksfoot—are also at times liable to infection, but usually not to the same extent as fescue) for any lengthy period, particularly during the winter months, very frequently develop a condition known as ergotism.

During the summer and autumn months cattle lose condition rather rapidly, their coat becomes rough, and there is a tendency to lameness. With the approach of winter and colder conditions lameness becomes very acute and is accompanied by leg swellings—usually the left hind leg is first attacked—from the hock or knee downwards. Later on dry gangrene sets in, the skin dies above the fetlock, and ultimately the foot drops off. The condition of ergotism is brought about by the action of ergot in causing contraction of the walls of blood-vessels, thus imparing circulation, and preventing the affected parts from receiving proper nourishment. The mortality in cattle in some of the badly infested fescue districts is often very high.

Paspalum in North Taranaki.

THE value of paspalum for summer feed has for many years been recognized by farmers north of Urenui, and there are many excellent swards of paspalum and white clover on the river-flats and more fertile soils along the coast towards Mokau. Around New Plymouth and Waitara the past two seasons has seen a rapid increase in the amount of paspalum in dairying pastures, due to favourable reseeding from scattered plants which have been present for many years.

Local opinion generally is that paspalum should be kept out. From the way paspalum thrives in this locality, however, it is apparent that the plant is there to stay and to increase. The highly palatable leaf-production during the summer and well into the autumn is considered now by many a valuable addition to the pastures. Providing the summer growth is controlled, no reduction in the growth and quantity of rye in the autumn, winter, and spring should take place, and white clover thrives in conjunction with paspalum.

Paspalum in the warmer coastal districts is likely to prove a better late summer producer than cocksfoot, and certainly preferable to ratstail on dry, sunny faces. A paddock of paspalum on the Manaia Demonstration Farm in South Taranaki is giving a lot of feed, and local farmers are keenly interested.

—C. J. Hamblyn, Palmerston North.

Autumn Harrowing of Pastures.

TO spread animal droppings it is a good practice to harrow pastures in the autumn. This can generally be done about March, when the rains have sufficiently softened all droppings which have accumulated on the paddocks during the past summer. For a thorough distribution the harrowing should be done twice—one stroke at right-angles to the other.

Animal droppings have a considerable fertilizing value, as seen to a great extent in the rank growth in and around droppings which have not been disturbed.

By keeping pastures as even in growth as possible, effective and efficient grazing is secured, and harrowing to spread manure certainly helps in attaining this object.

—J. M. Hopkins, Taumarunui.

Cleaning up Maize Crops with Sheep.

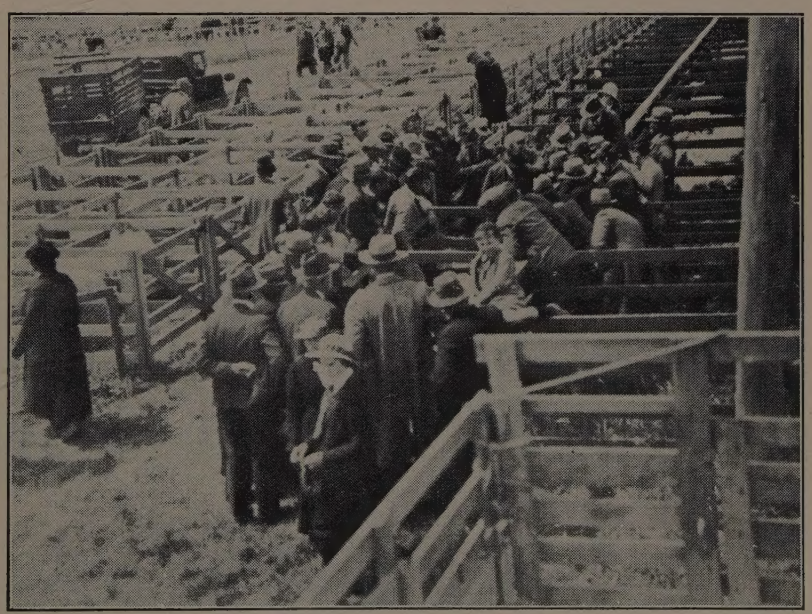
AT this period most maize crops show a good deal of weed-growth, which acts as a harbour for insect pests. It also keeps the crops damp, thus causing rotting of any cobs that may be down.

To overcome this trouble, and at the same time provide much better conditions for harvesting, it is a good practice to turn mobs of sheep into the maize crops at the present time. They will eat out much of the weed-growth and most of the lower maize leaves, after which the fields are quite clean, and maize-picking can proceed at a later date without the inconvenience of a thick maze of undergrowth.

Sheep should be used in large numbers, so as to clear up the rank growth as quickly as possible. Where small mobs are kept on for lengthy periods some will commence to chew the maize-stems before the weeds and lower maize-leaves have been consumed. Needless to say, this is undesirable, and must be prevented by the removal of the sheep when noticed.

At this period practically every maize field is quite dry enough to permit of such grazing, but if action along these lines is not taken before autumn rains set in growers will find conditions too wet for using sheep on the low country.

—C. Walker, Tauranga.



Young farmers attending demonstration on sheep following a stock-judging competition at Outram.

Slaughterings of Stock

THE following return of slaughterings of stock at meat-export slaughterhouses and abattoirs for the nine months, 31st May, 1937, to 31st January, 1938, has been compiled by the Live-stock Division :—

—	Cattle.	Calves.	Sheep.	Sheep, of which Ewes.	Lambs.	Pigs.
North Island.						
Meat-export slaughterhouses—						
Auckland	89,872	585,014	96,332	41,969	891,589	276,267
Poverty Bay-Hawke's Bay ..	20,582	40,666	285,187	111,022	780,855	31,198
Taranaki-Manawatu	61,471	244,246	137,594	65,986	951,957	146,265
Wellington-Wairarapa	25,972	26,465	216,874	77,114	618,038	40,793
Totals	197,897	896,391	735,987	296,091	3,242,439	494,523
Abattoirs	90,796	31,329	270,139	158,121	42,673	78,145
North Island totals	288,693	927,720	1,006,126	454,212	3,285,112	572,668
South Island.						
Meat-export slaughterhouses—						
Nelson-Marlborough	243	8,907	2,874	1,483	85,191	7,623
Canterbury	12,947	36,203	185,778	138,990	1,044,310	32,851
Otago-Southland	8,055	47,833	44,160	38,899	1,255,459	3,259
Totals	21,245	92,943	232,812	179,372	2,384,960	43,733
Abattoirs	45,417	10,927	187,864	85,841	26,832	21,387
South Island totals	66,662	103,870	420,676	265,213	2,411,792	65,120
Dominion.						
Meat-export slaughterhouses ..	219,142	989,334	968,799	475,463	5,627,399	538,256
Abattoirs	136,213	42,256	458,003	243,962	69,505	99,532
Grand totals	355,355	1,031,590	1,426,802	719,425	5,696,904	637,788
In addition, the following stock were slaughtered at rural slaughterhouses for local consumption during the nine months ended 31st December, 1937	65,878	1,507	159,741	..	13,281	21,262
Same period, 1936–37—						
Meat-works and abattoirs ..	275,384	1,014,166	1,069,961	728,152	5,125,414	609,207
Rural slaughterhouses	66,361	1,459	159,577	..	14,746	20,526
Same period, 1935–36—						
Meat-works and abattoirs ..	329,953	1,047,902	1,257,617	597,622	4,277,467	627,007
Rural slaughterhouses	62,348	1,634	155,353	..	14,813	20,309

Members of the Wairarapa District Y.F.C. Committee.

Seated (left to right) : C. J. Hamblyn (Department of Agriculture, Palmerston North); S. A. La Roche (Masterton); N. Lamont (Department of Agriculture), District Secretary; W. F. McLaren (Dominion President), Chairman; J. H. Bremner, Vice-Chairman; M. Boddington, Treasurer; W. James (Masterton).

Standing (left to right) : G. Blatchford (Masterton); B. Brasell (Carterton); S. Fisher (Carterton); D. McGregor (Masterton); C. Sievers (Martinborough); N. Martin (Martinborough); K. Pryde (Mangatainoka); W. Holdaway (Ballance).

Autumn and Winter Feeding of Dairy Heifers.

THE in-calf dairy heifers should receive good care and attention during the autumn and winter to ensure that they will come into profit in the best possible condition. Place them on good pasture and feed out good, sweet hay according to the appetites of the animals. Rock salt should always be accessible. The following lick is to be recommended :—

2 cwt. salt.
1 cwt. limonite.
25 lb. molasses.
2 cwt. steamed bone-flour.
50 lb. flowers of sulphur.
3 oz. potassium iodide.

Mix the salt, bone-flour, and sulphur together dry on a board or concrete floor. Pour on the potassium iodide and molasses and mix the whole mass thoroughly. This lick should be placed in a box so constructed as to give the greatest possible protection from the rain.

—T. E. Rodda, Manager, Ruakura Farm of Instruction.

Flame-throwers.

A GREAT deal can be said for and against the flame-thrower for the destruction of gorse, broom, and blackberry, and for cleaning young manuka. From what the principal Inspector has noted of the work being done the best results are obtainable when the thrower is used on young stands of gorse, during dry spells of weather. A light run over in the first instance, followed in about a fortnight's time in suitable weather with a careful burn, gives excellent results.

Carelessly carried out on heavy gorse it is not effective. Broom can be practically eradicated when sufficient dry undercover is present to carry a fire. The same results can be obtained with a match.

Blackberry during the flowering stage can be well checked with the flame-thrower, but constant attention thereafter is necessary to complete its eradication, which necessarily is expensive. Last year, being a wet year, throughout Otago did not lend itself to burning off (some 390 flame-throwers have been sold in this district). At present the cost in using the thrower at 6d. per gallon is what is most against its general use.

—C. V. Dayus, District Superintendent, Otago.